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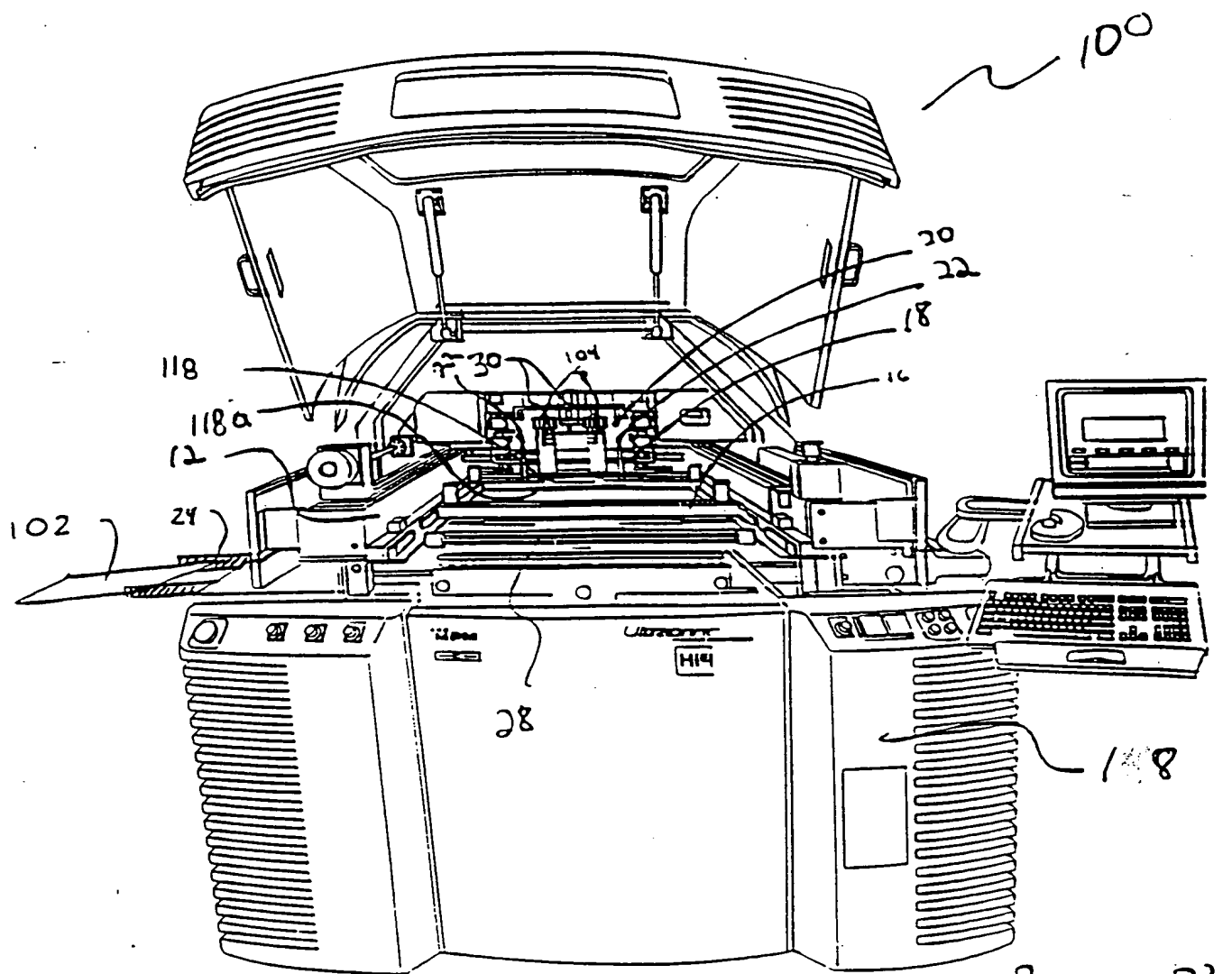


Fig. 1A

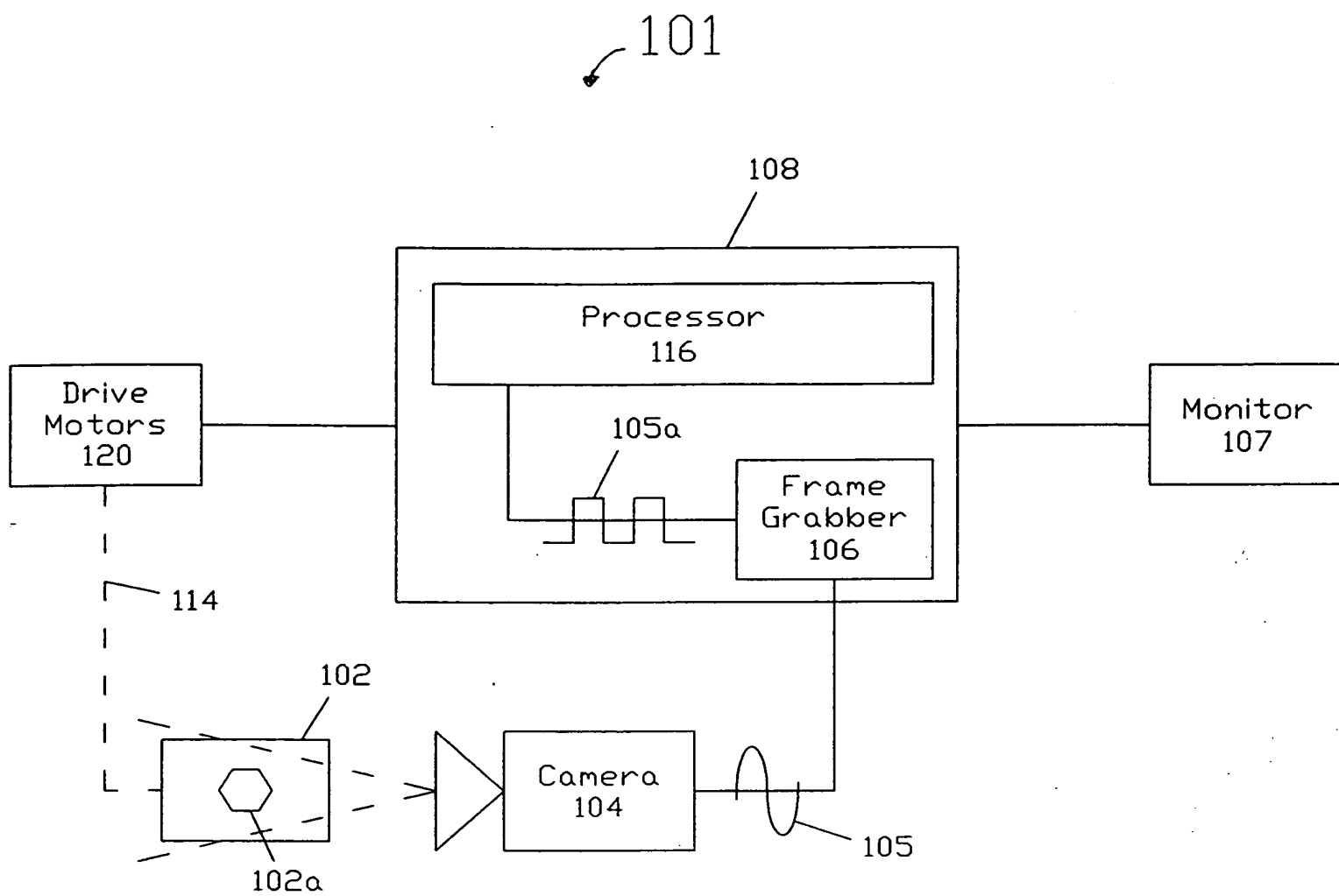


FIG. 1B

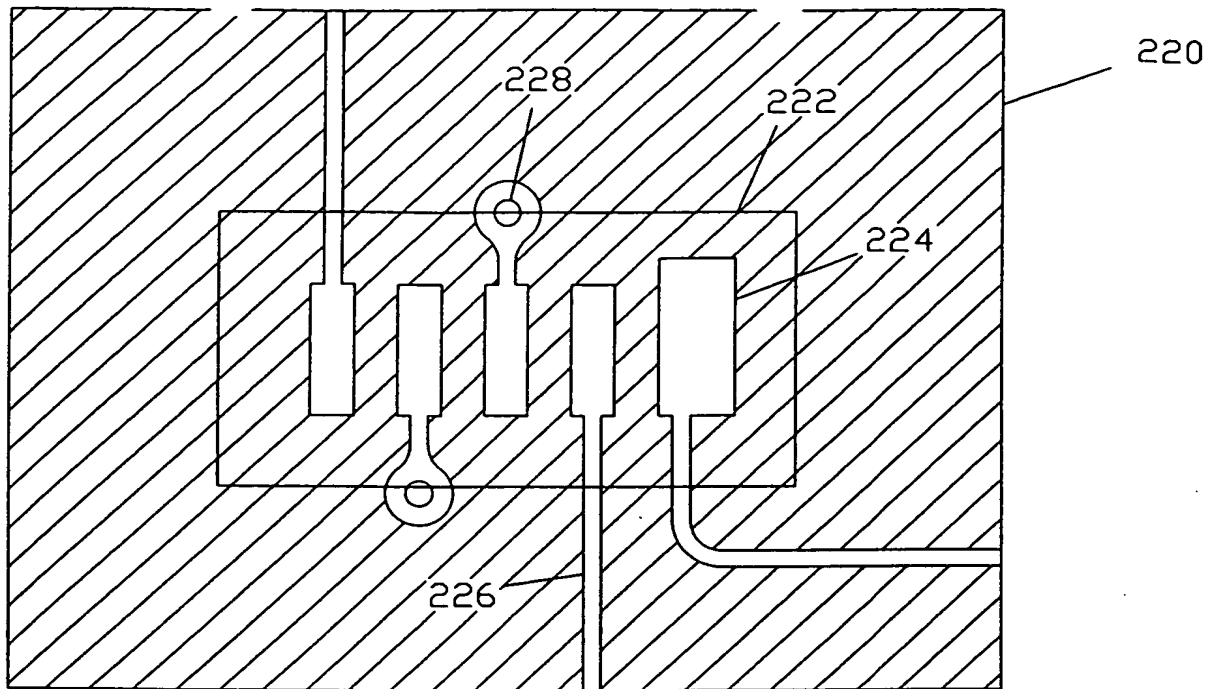


FIG. 2A

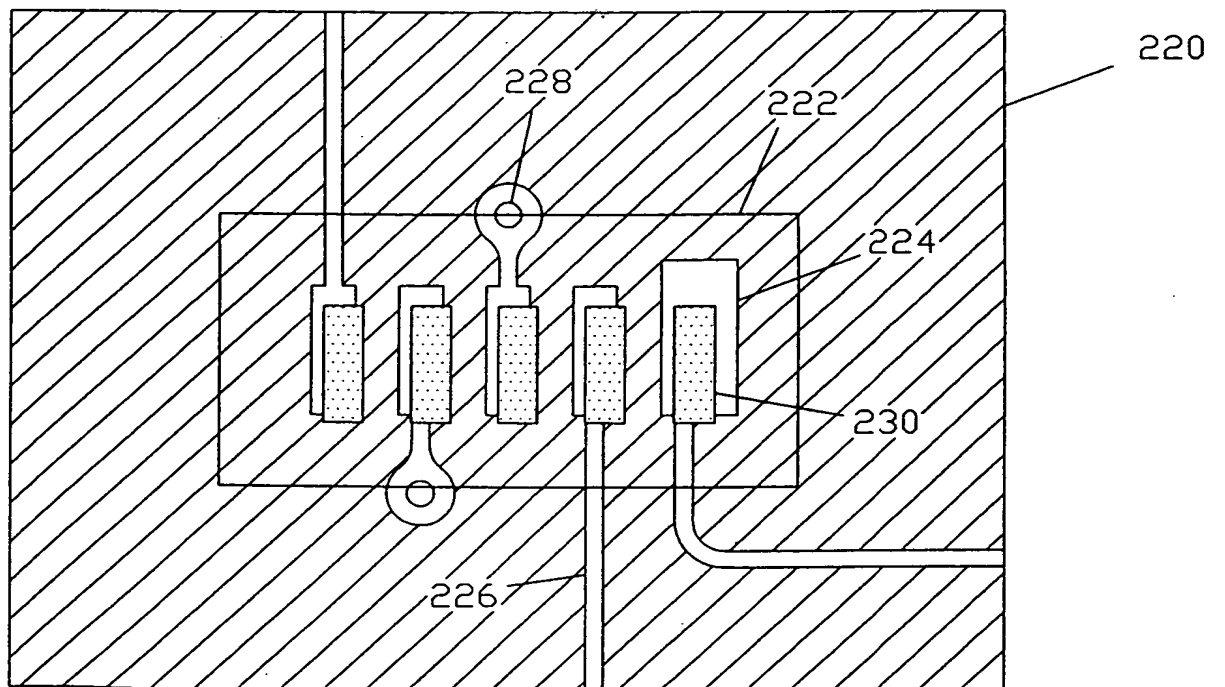


FIG. 2B

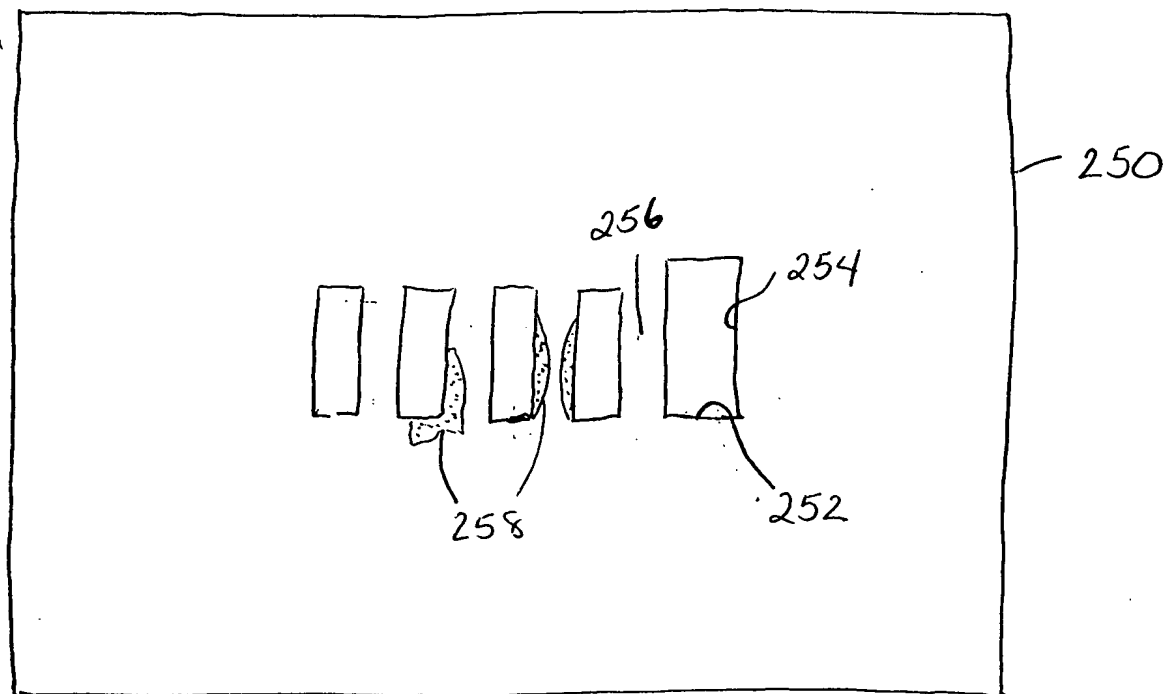
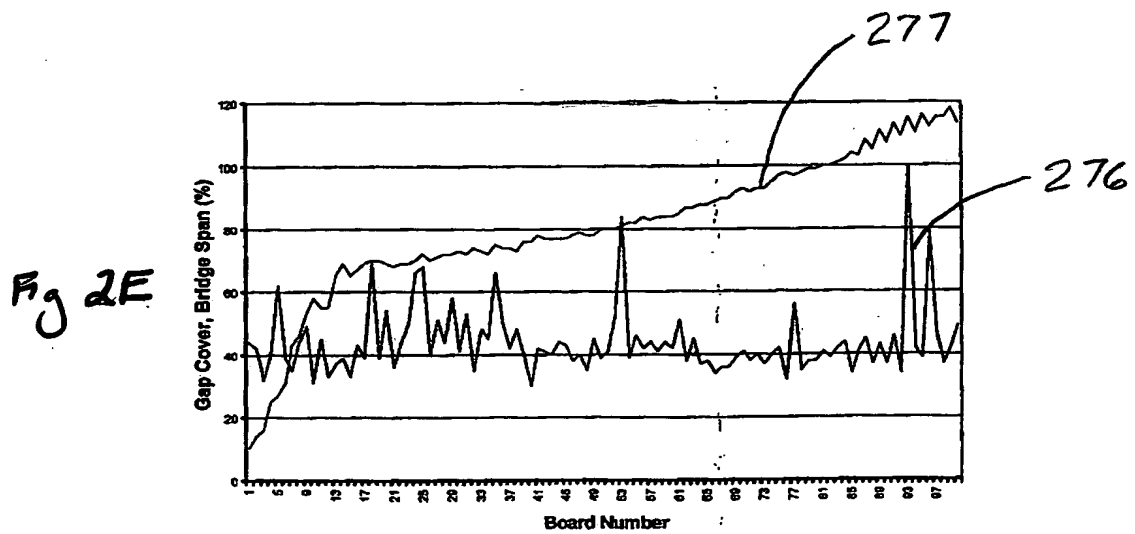
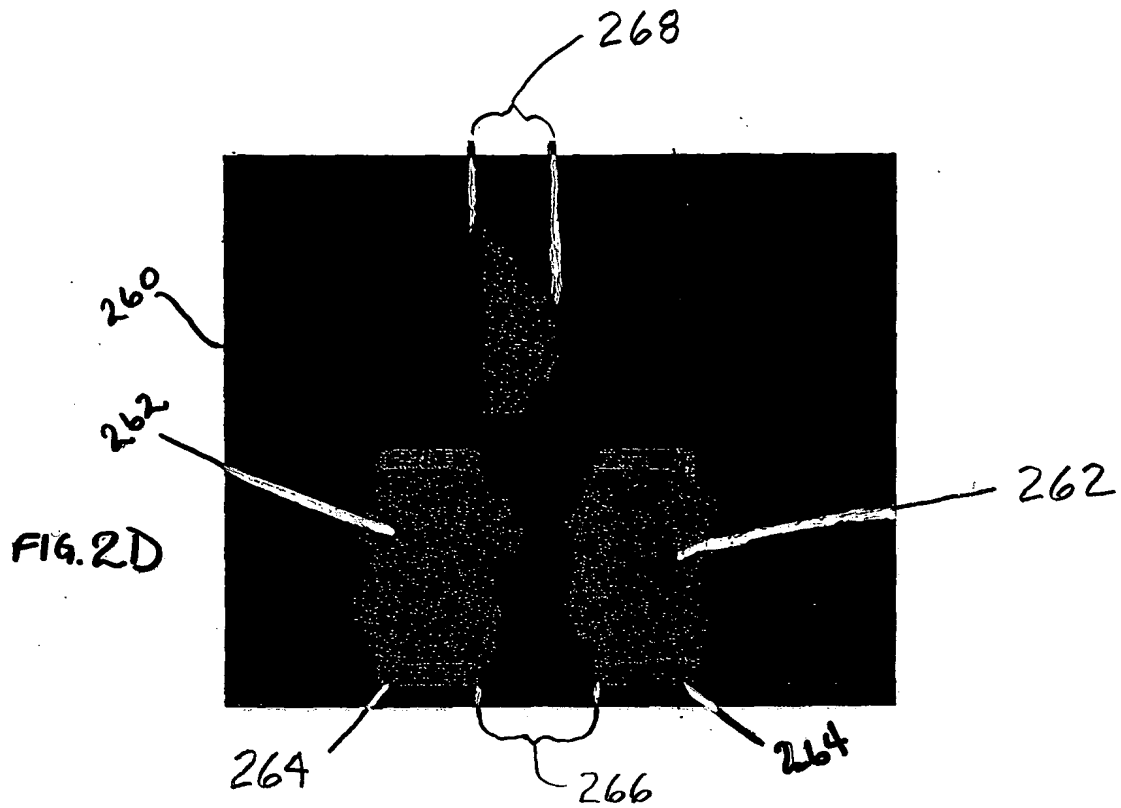
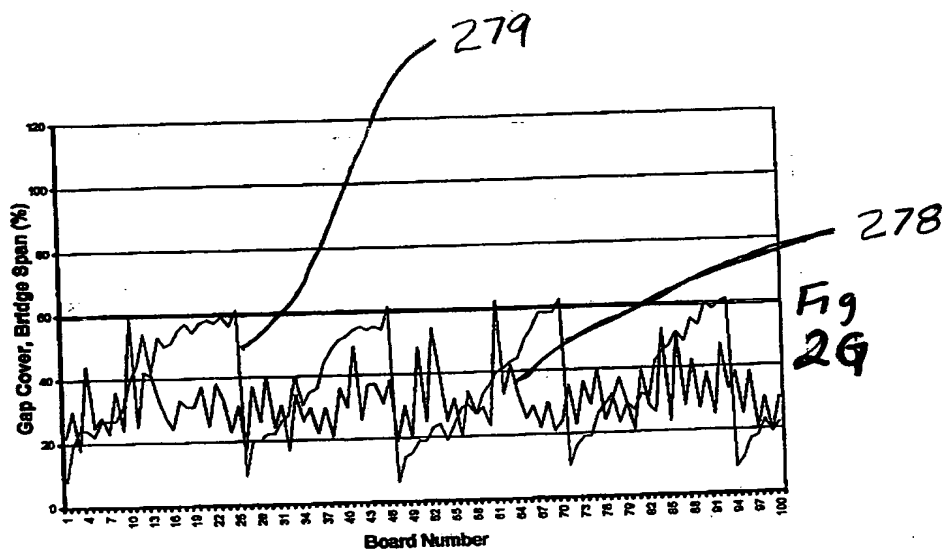
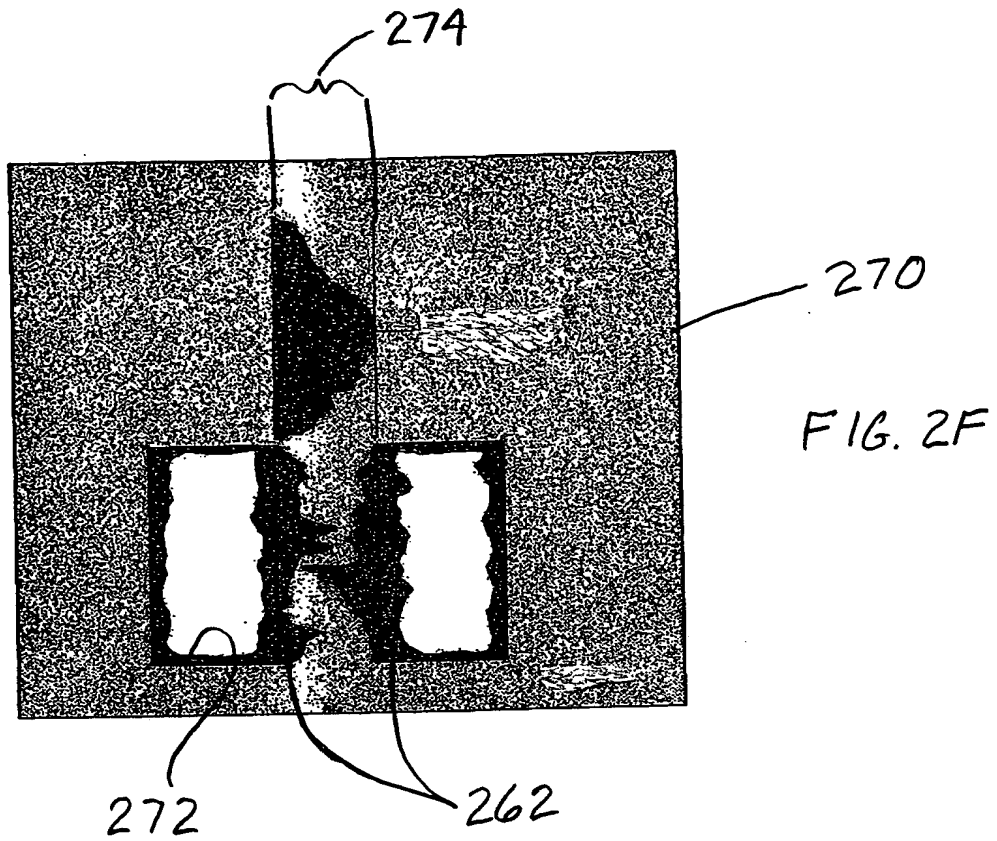


FIG. 2C

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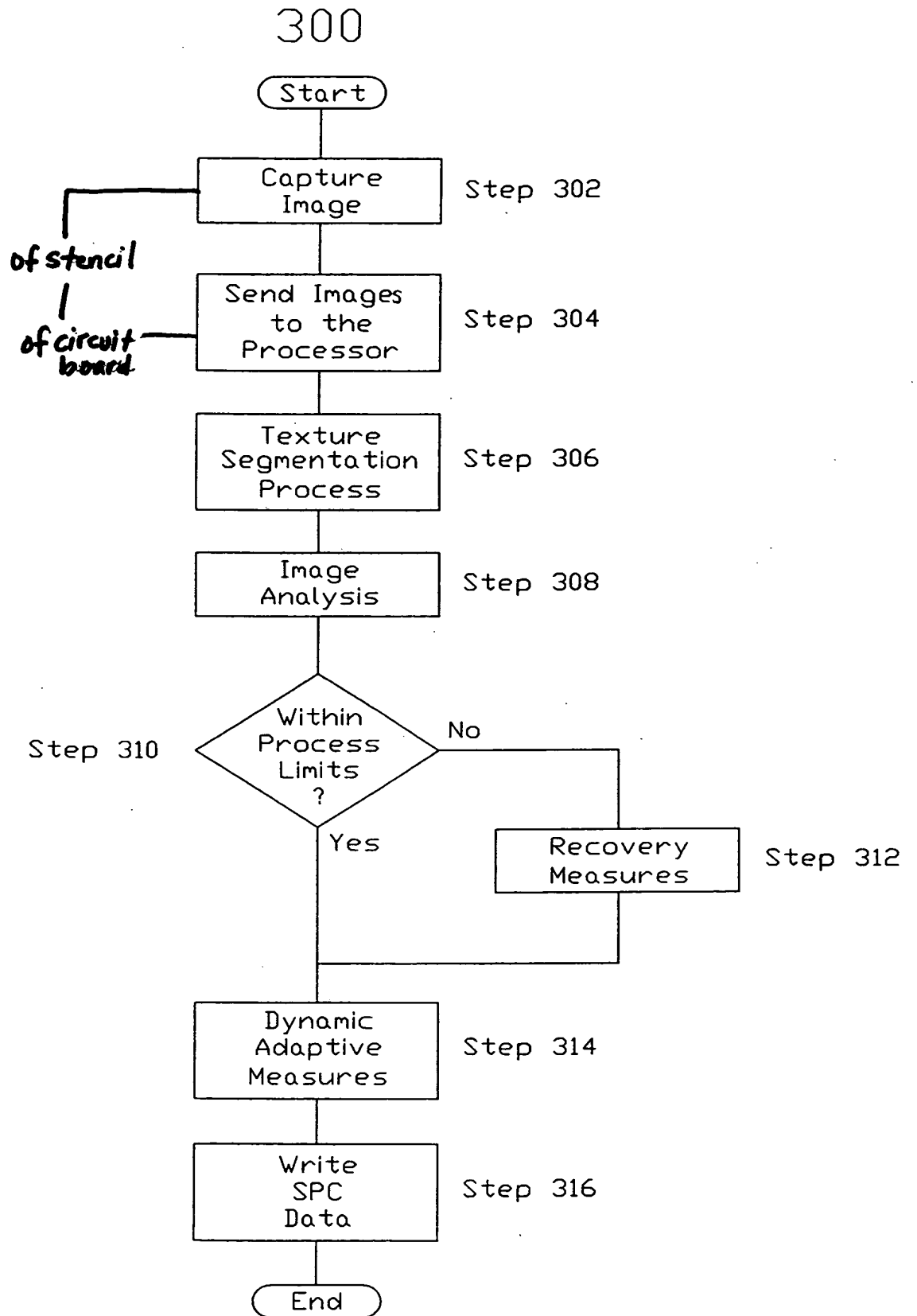


FIG. 3

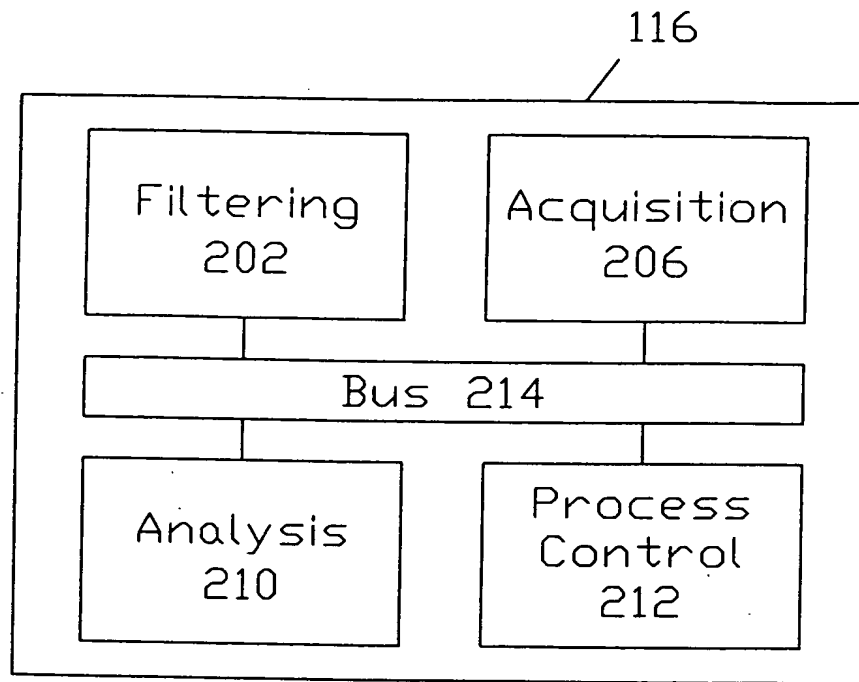


FIG. 4A

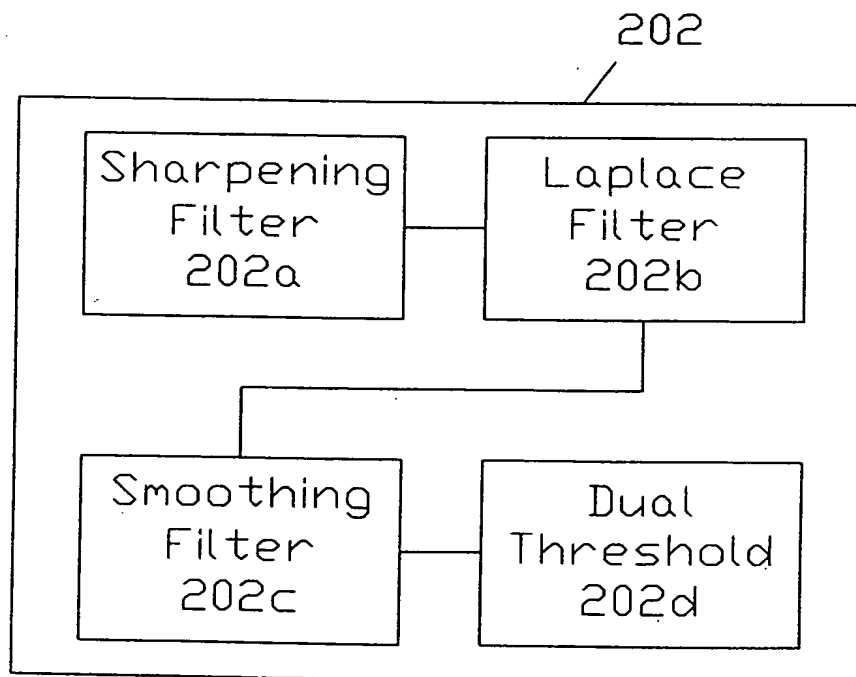


FIG. 4B

	1	
1	-4	1
	1	

FIG. 5A

	-1	
-1	5	-1
	-1	

FIG. 5B

1	1	1
1	1	1
1	1	1

FIG. 5C

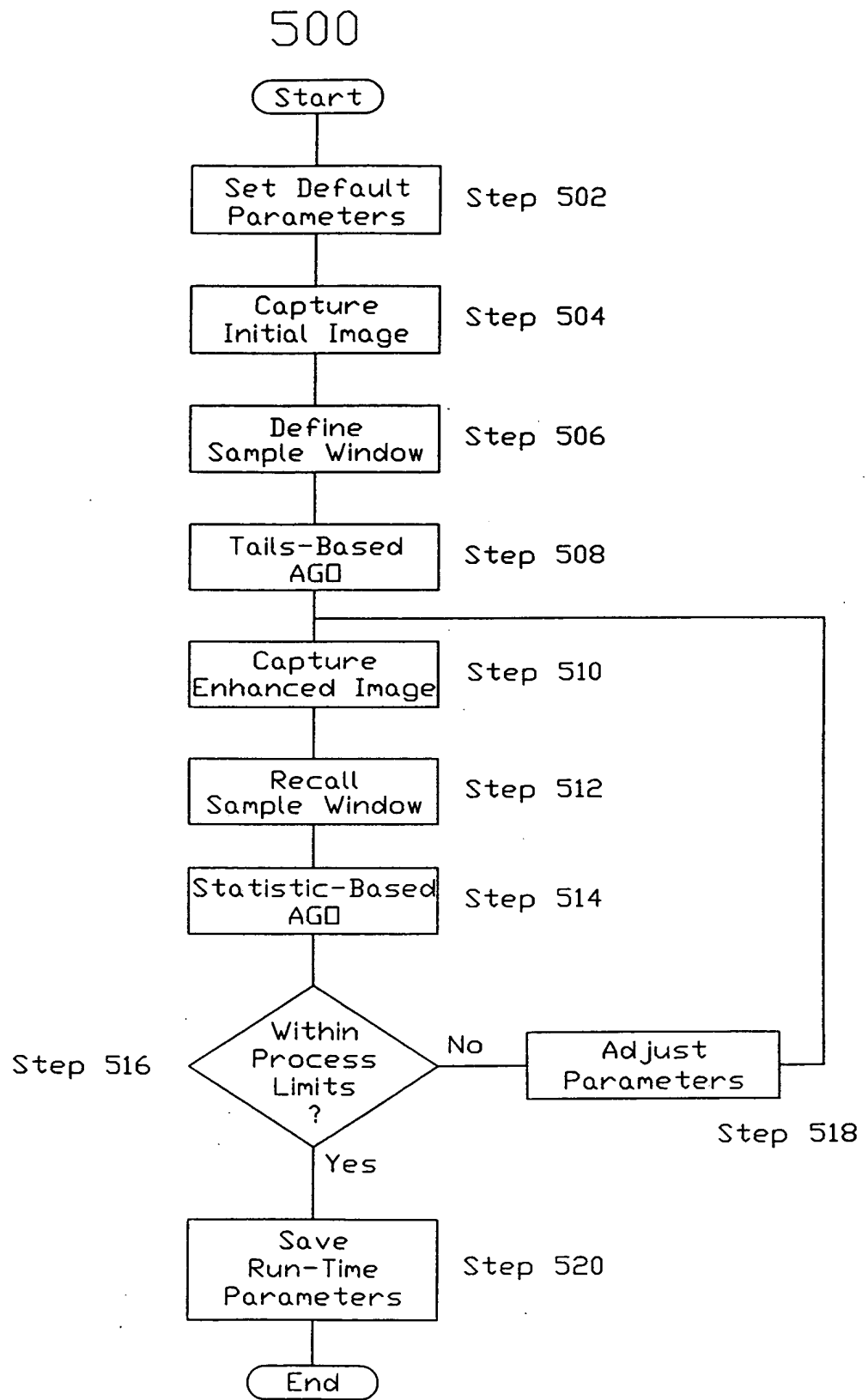


FIG. 6

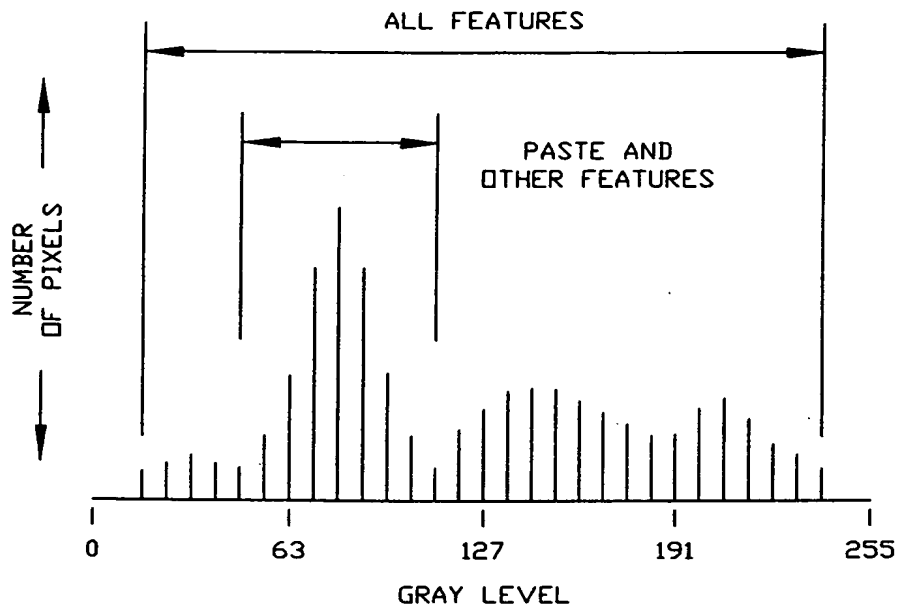


FIG. 7A

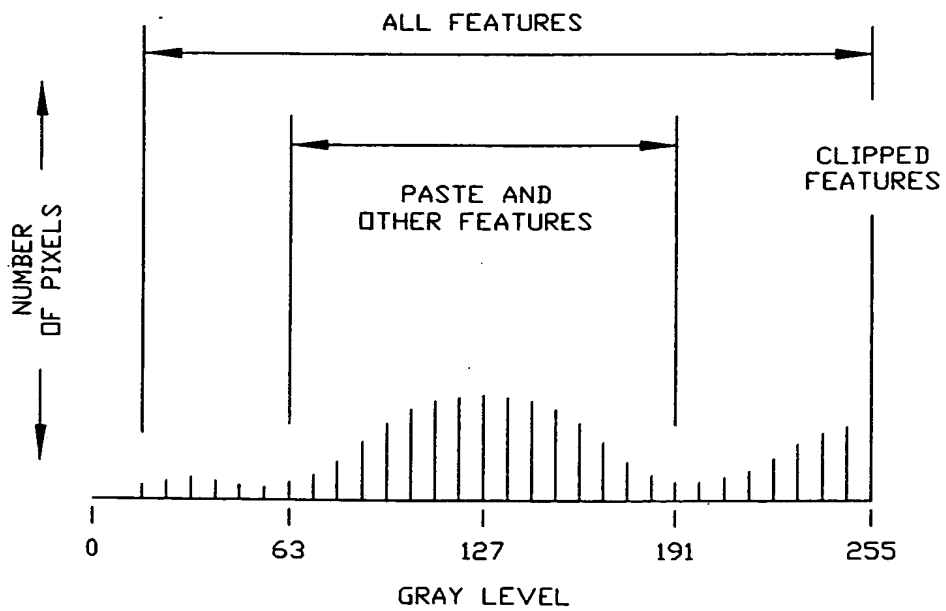


FIG. 7B

0.6621 mpp

Ø1.3242

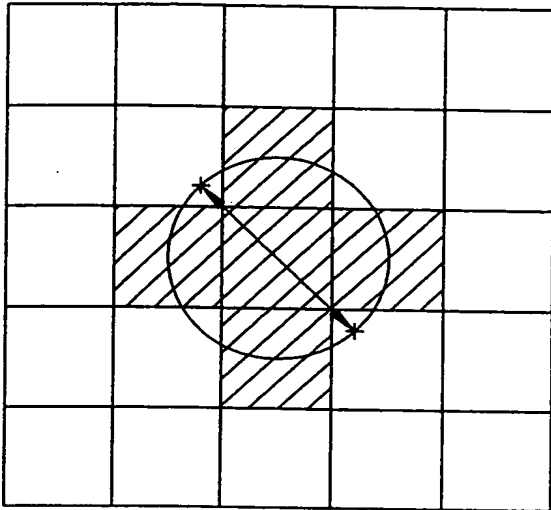


FIG. 8A

Ø1.8727

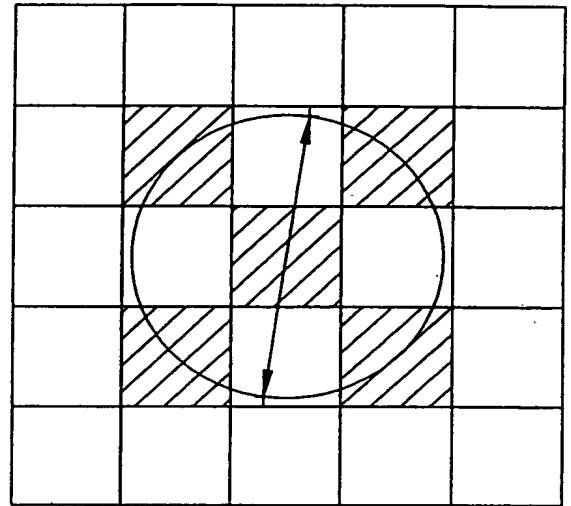


FIG. 8B

Ø2.6484

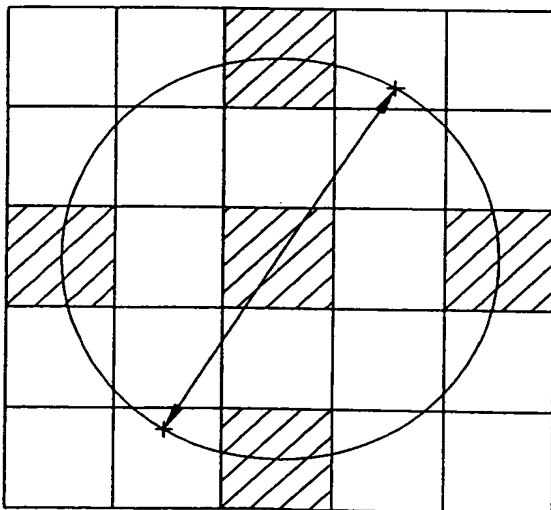


FIG. 8C

Ø3.7454

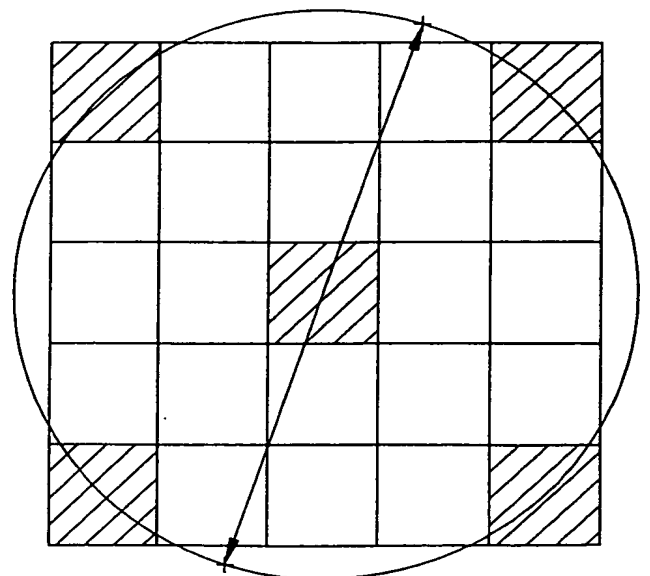


FIG. 8D

0.4797 mpp

Ø0.9594

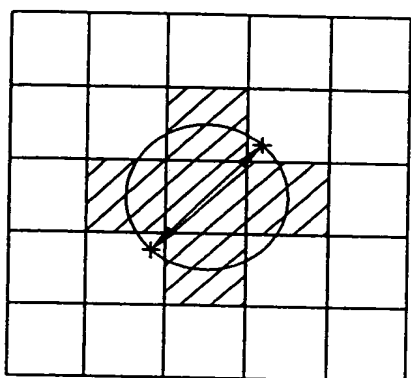


FIG. 8E

Ø1.3568

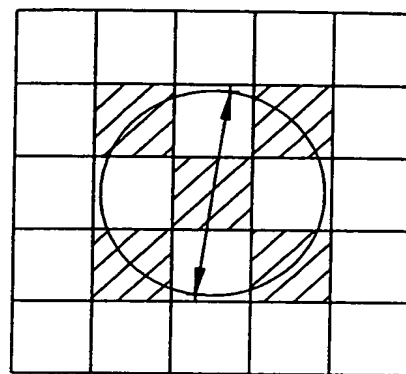


FIG. 8F

Ø1.9188

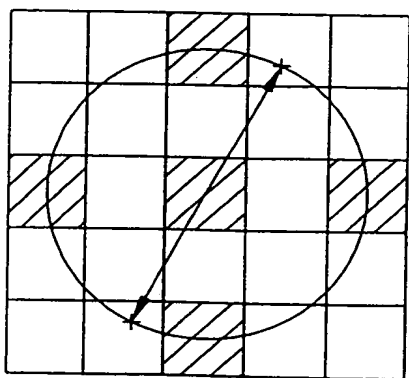


FIG. 8G

Ø2.7136

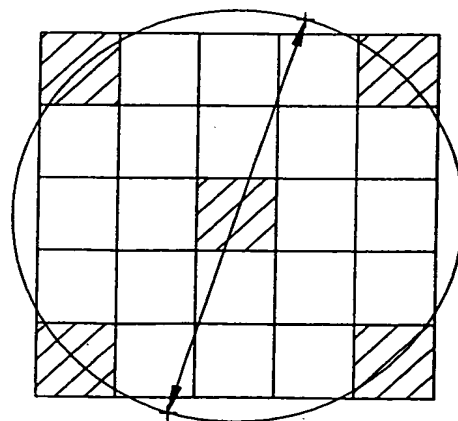


FIG. 8H

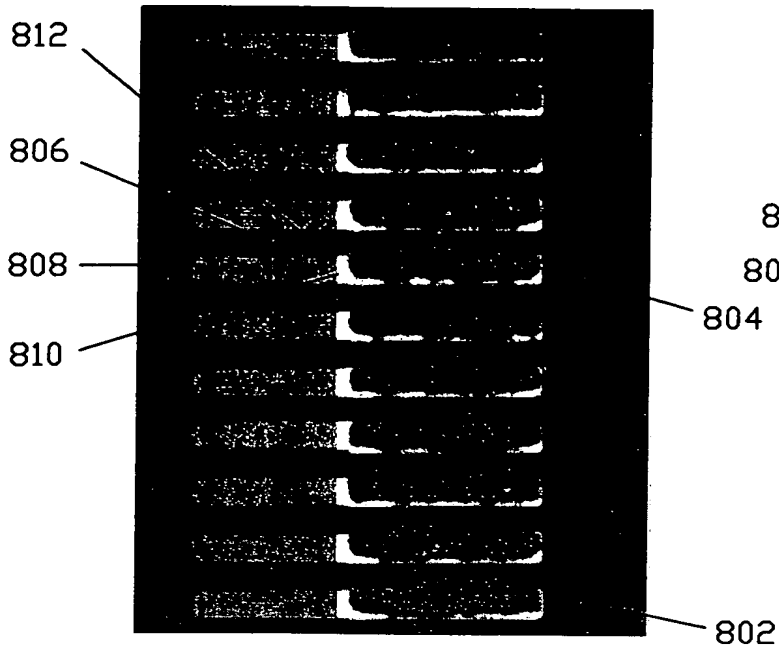


FIG. 9A

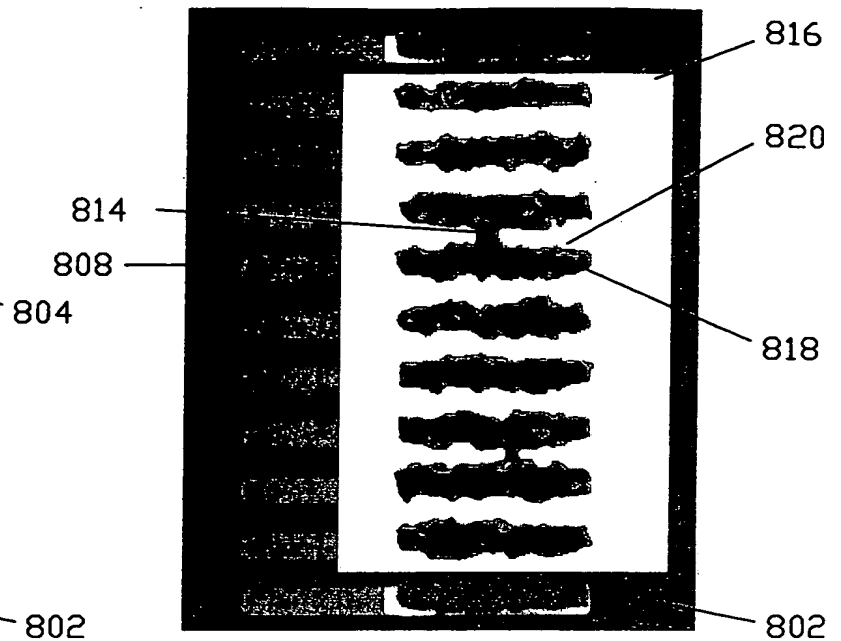


FIG. 9B

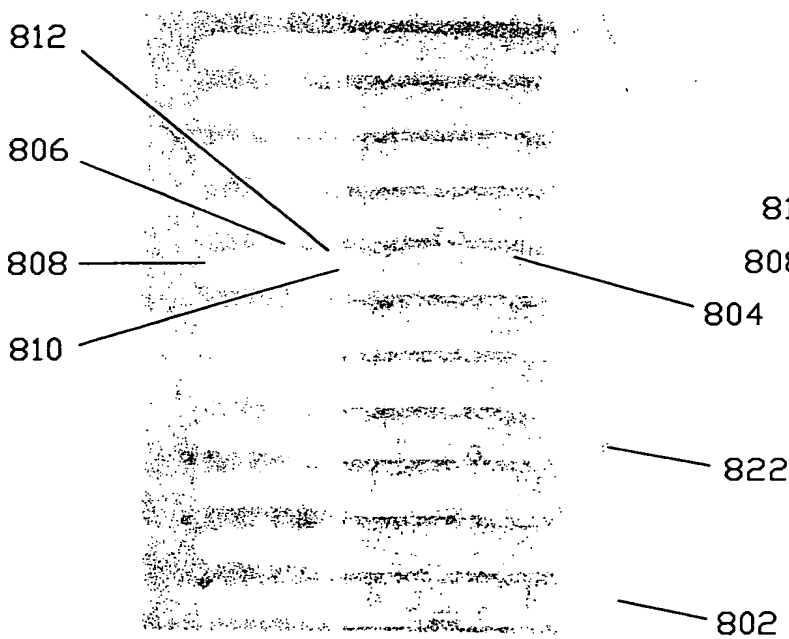


FIG. 9C

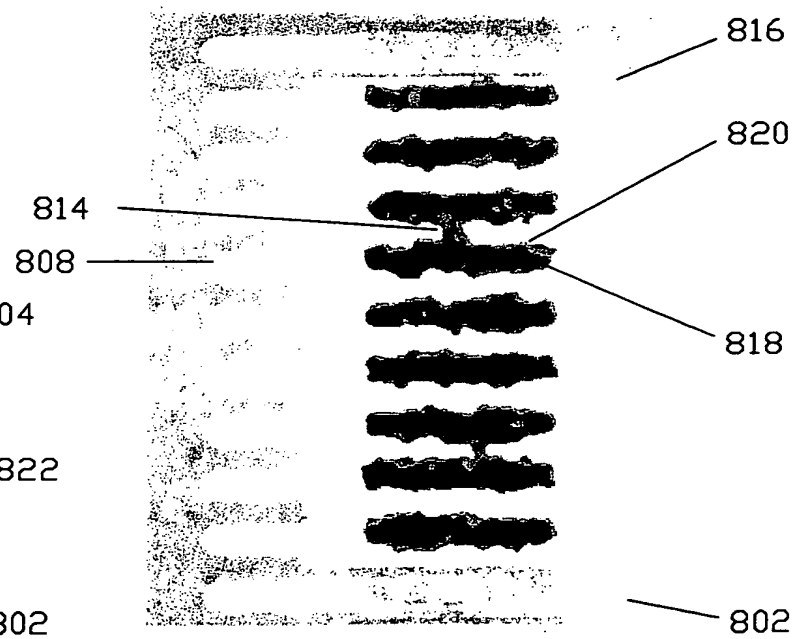


FIG. 9D

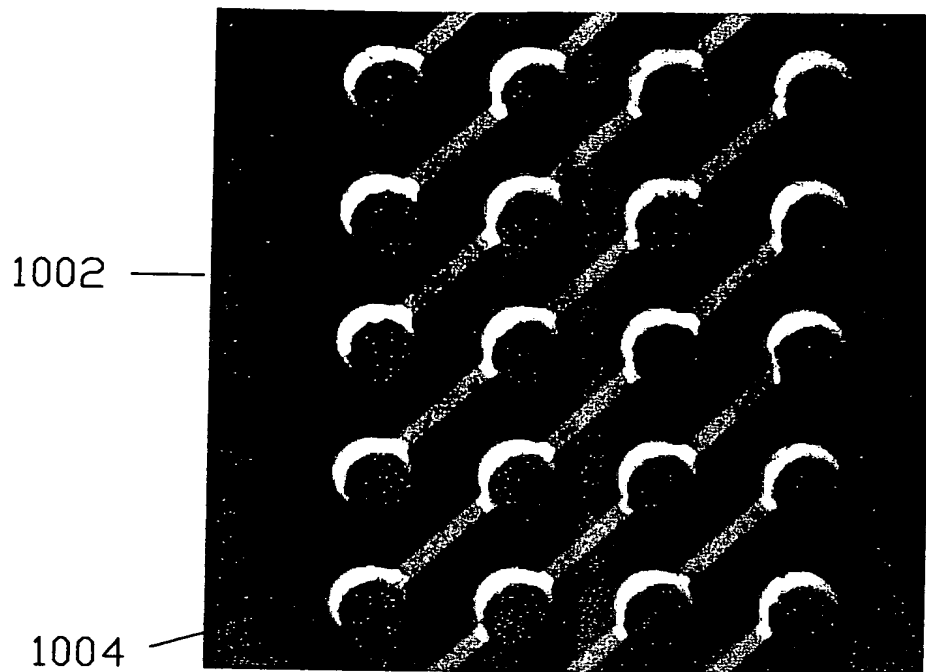


FIG. 10A

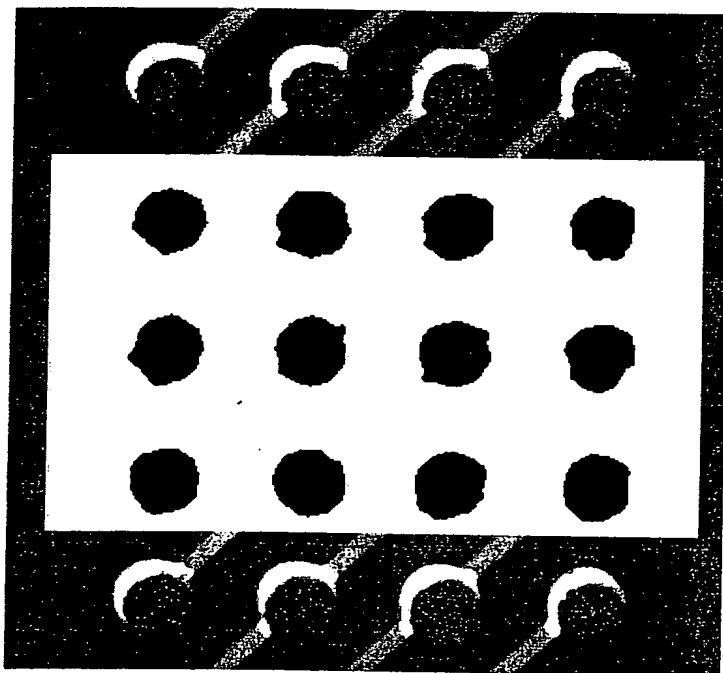


FIG. 10B

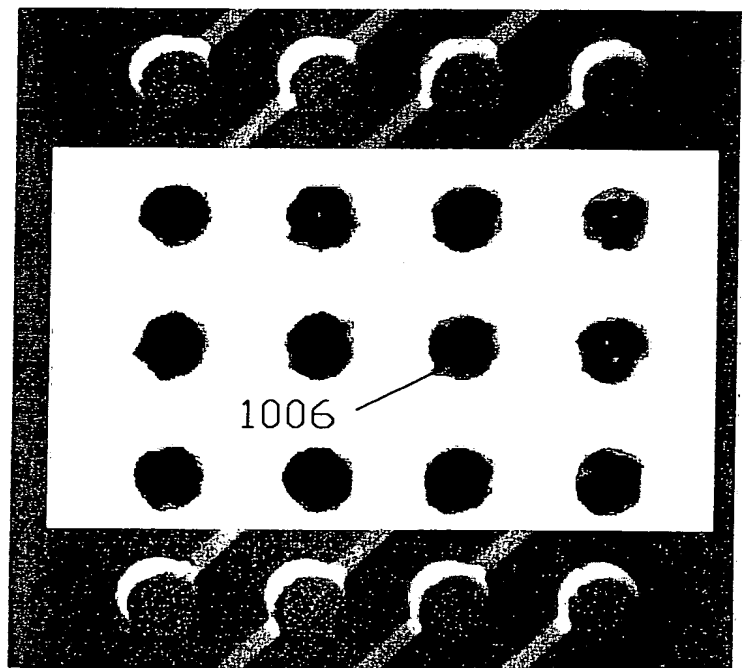


FIG. 10C

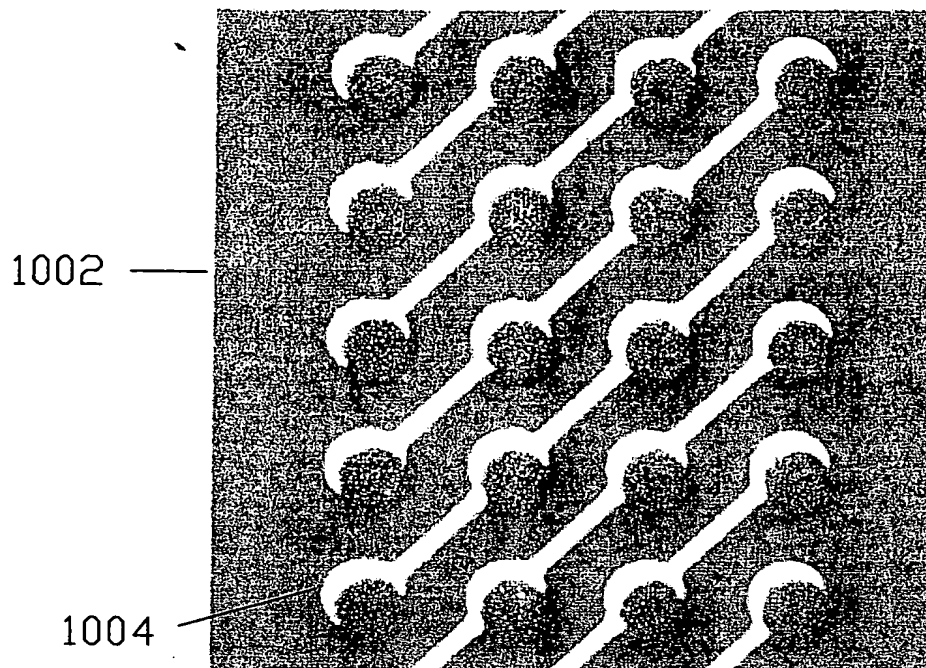


FIG. 11A

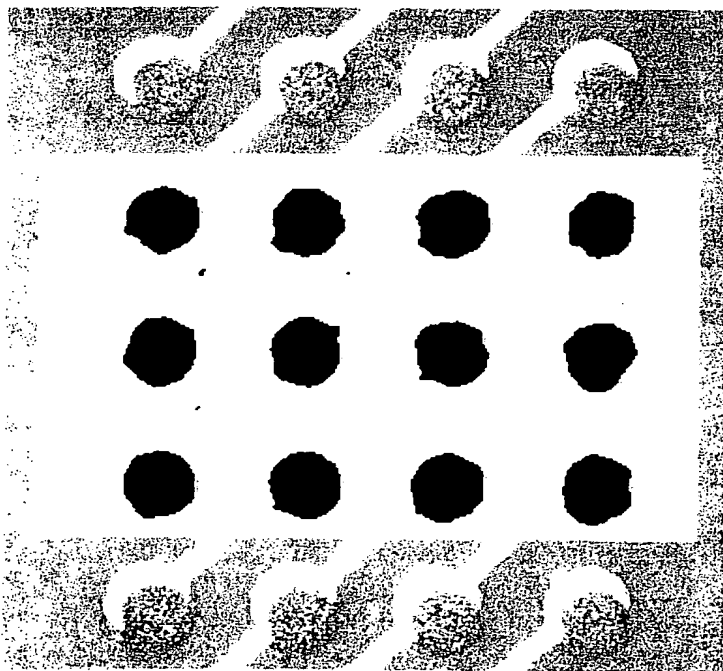


FIG. 11B

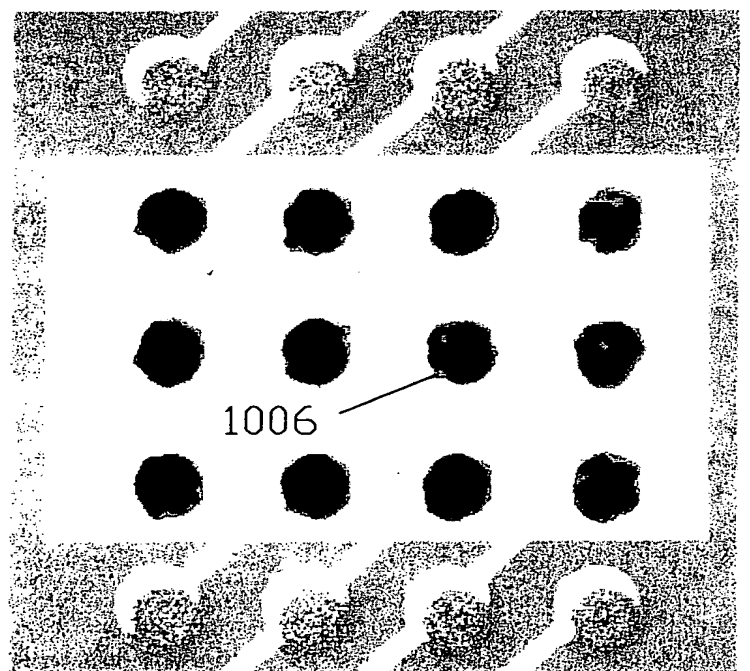


FIG. 11C

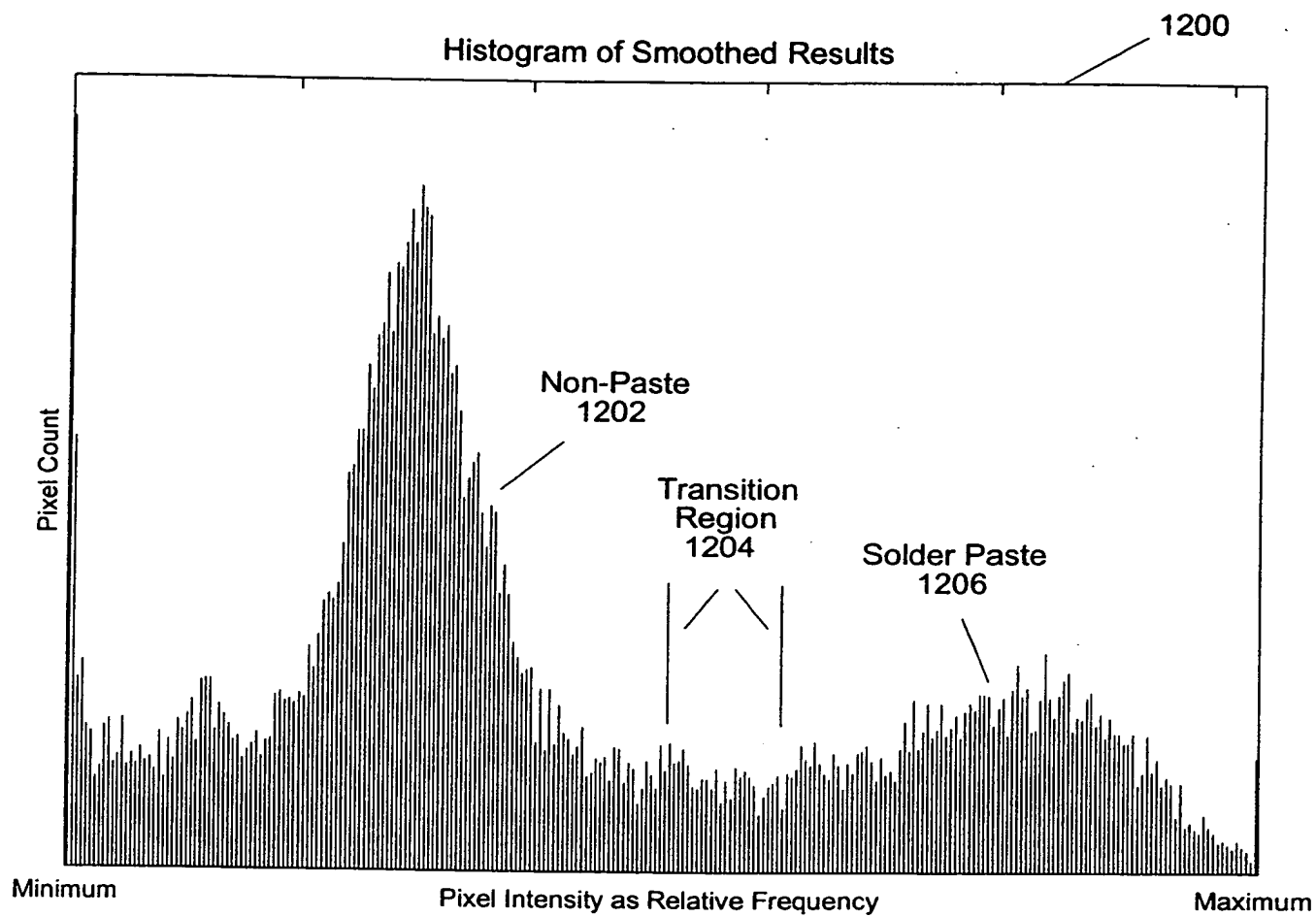


FIG. 12

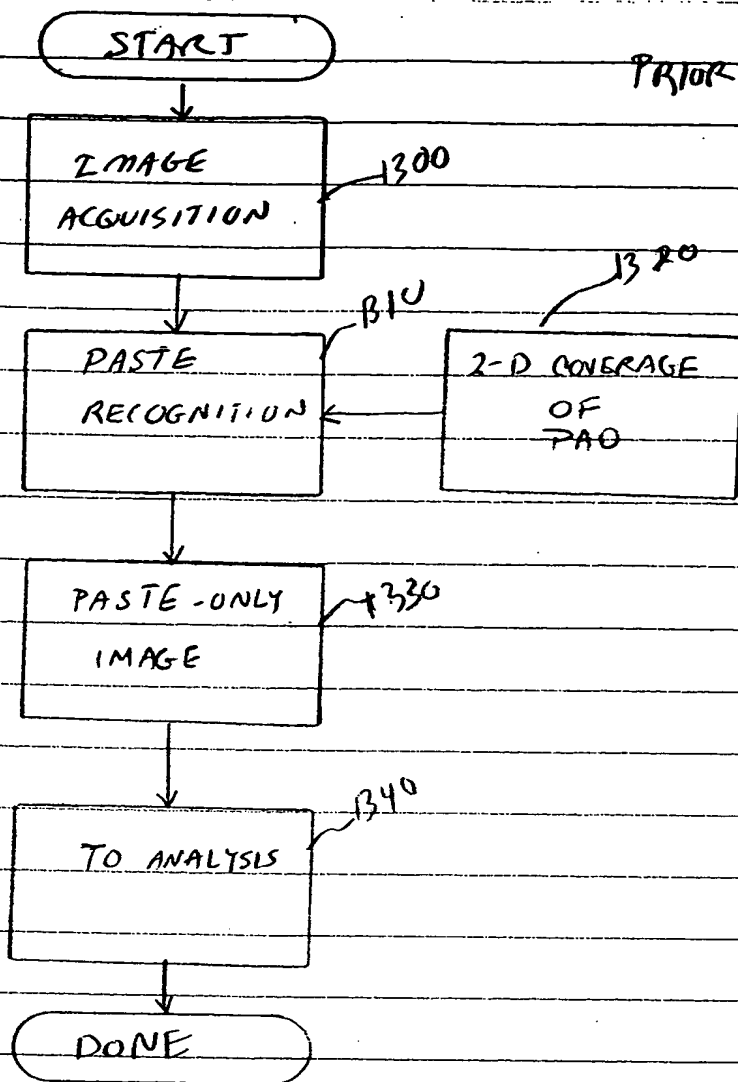


FIG. 13 generalized method for inspecting substrates.

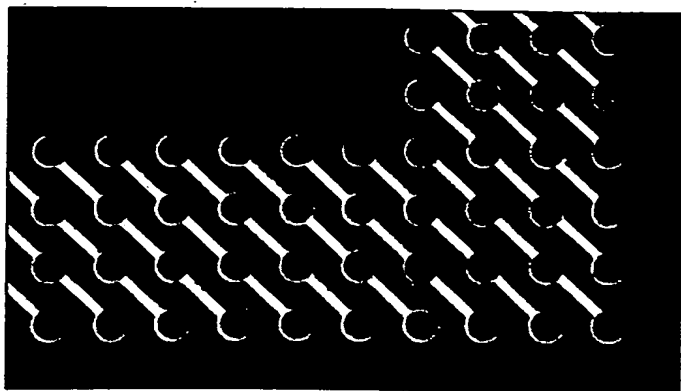


FIGURE : Grayscale image of paste using "white" light source.

FIG 14

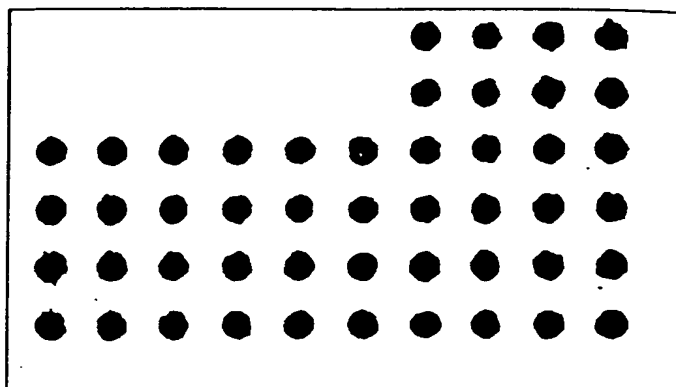


FIGURE : Weighted paste-only image via unique texture-based method.

FIG. 15



FIGURE 2a: RGB image of UV enhanced fluorescent paste.

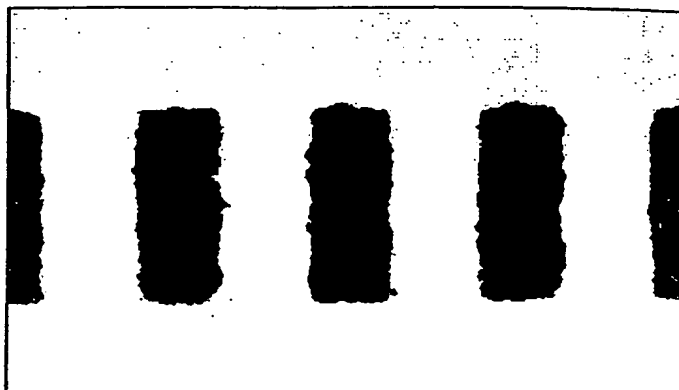


FIGURE 2b: Binary paste-only image from blue channel via single threshold method.

FIGs 16

Fig 17

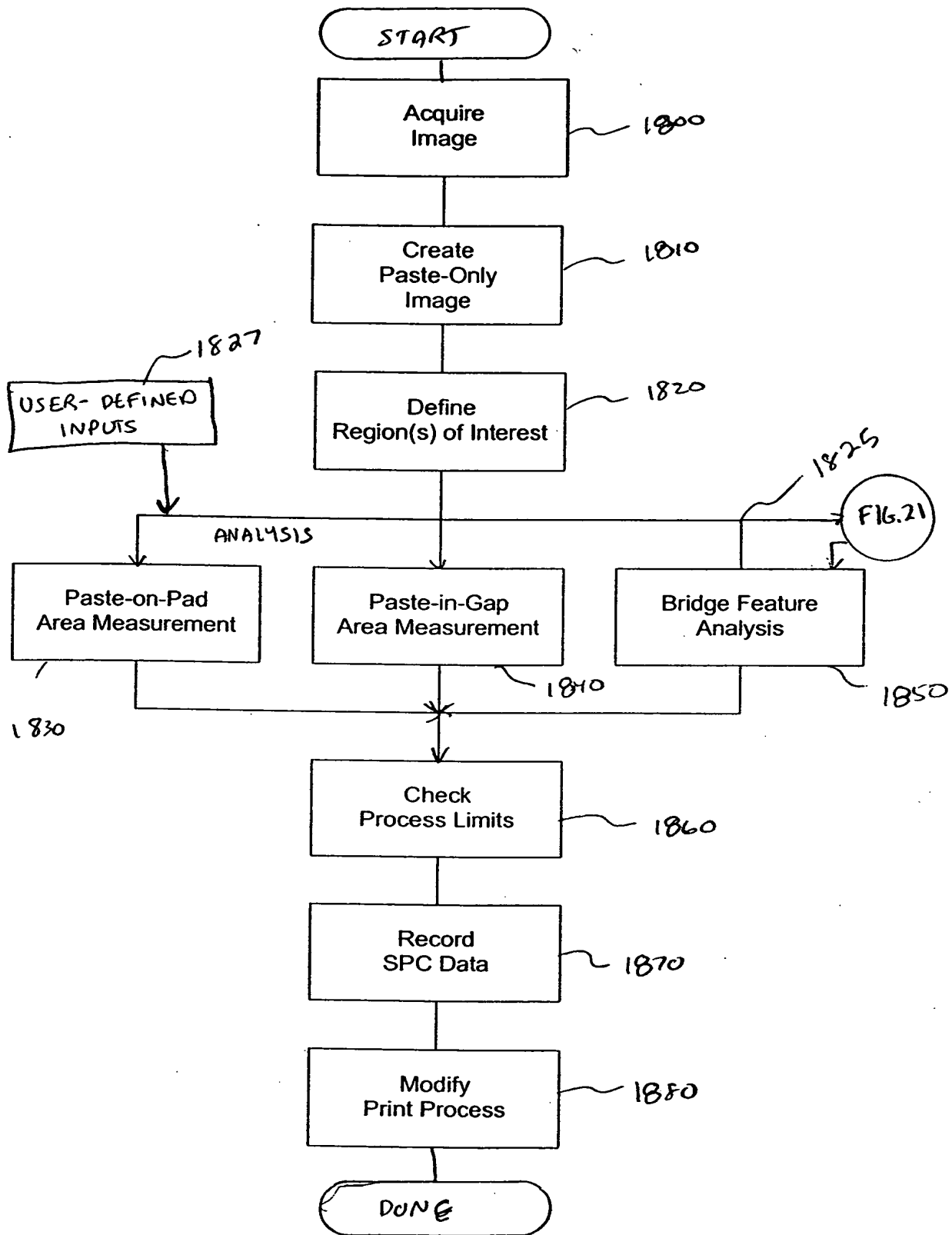


FIG. 18

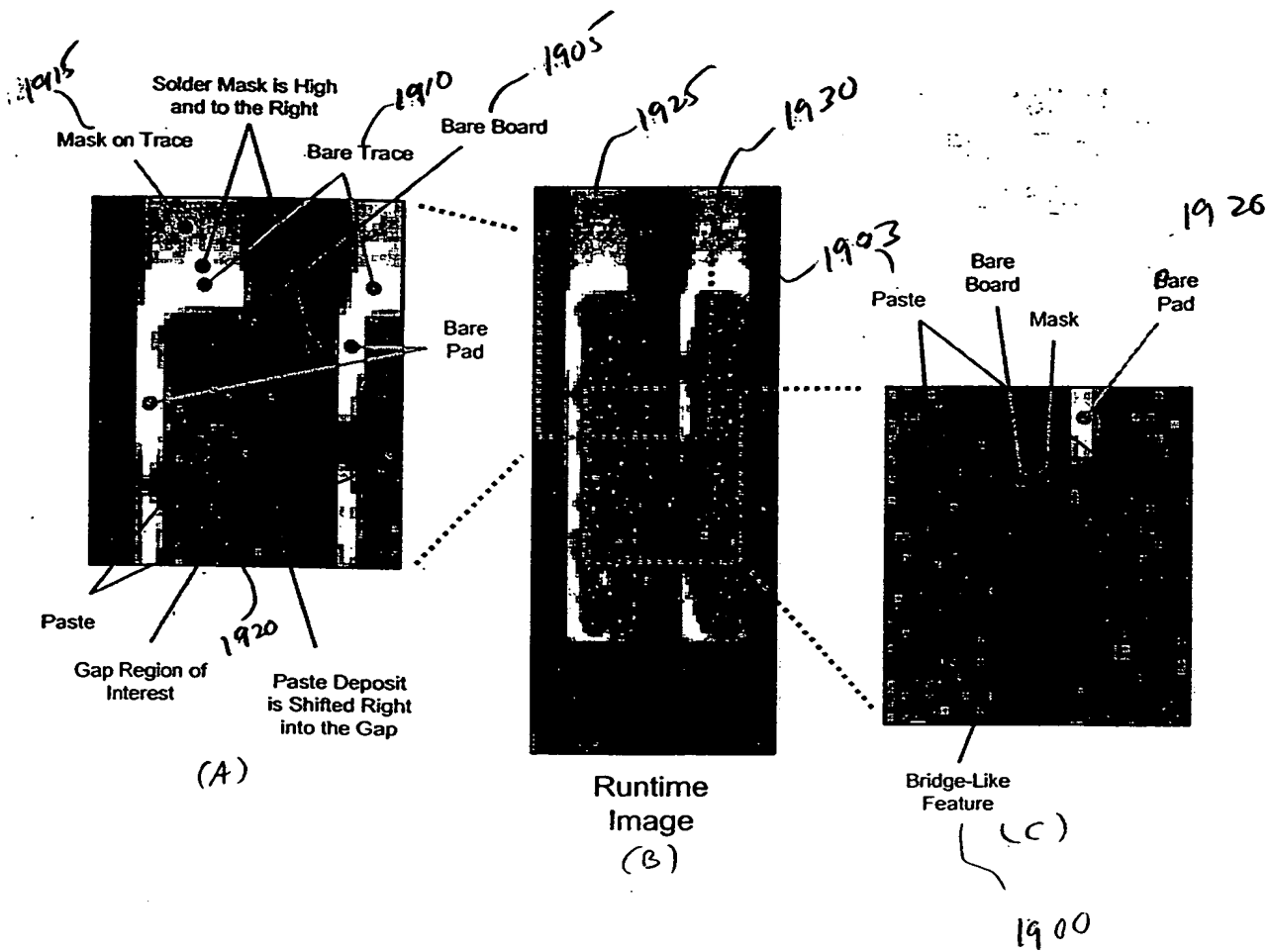


FIG. 19

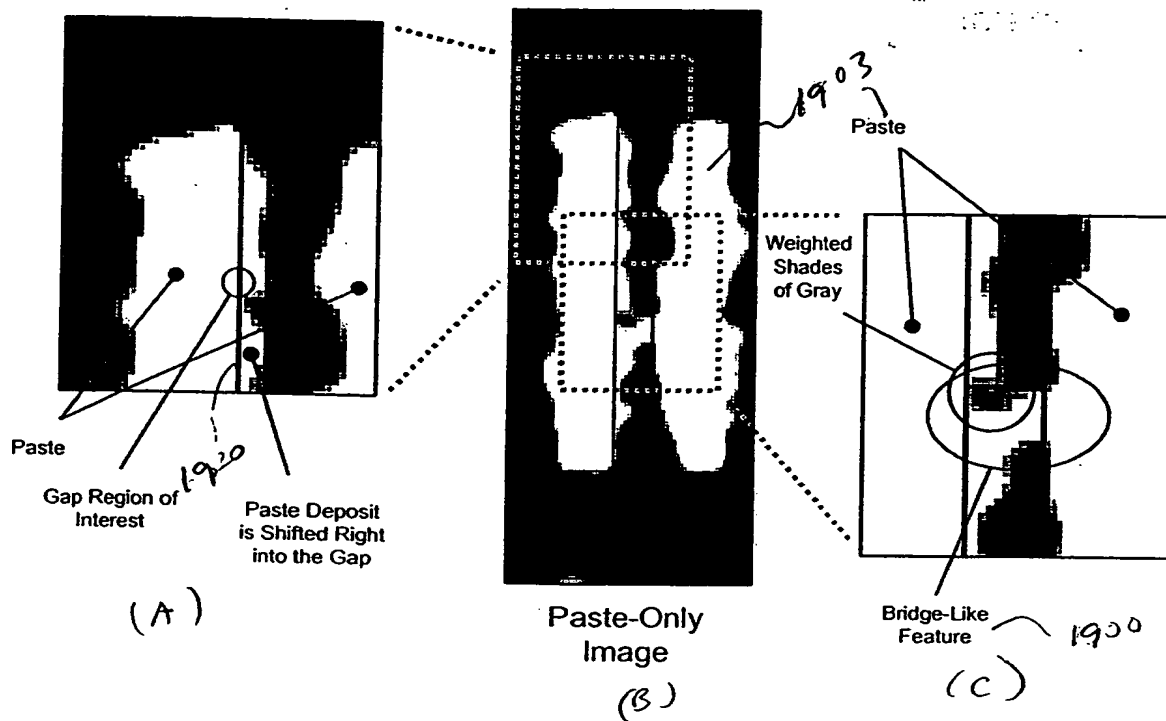


FIG. 20

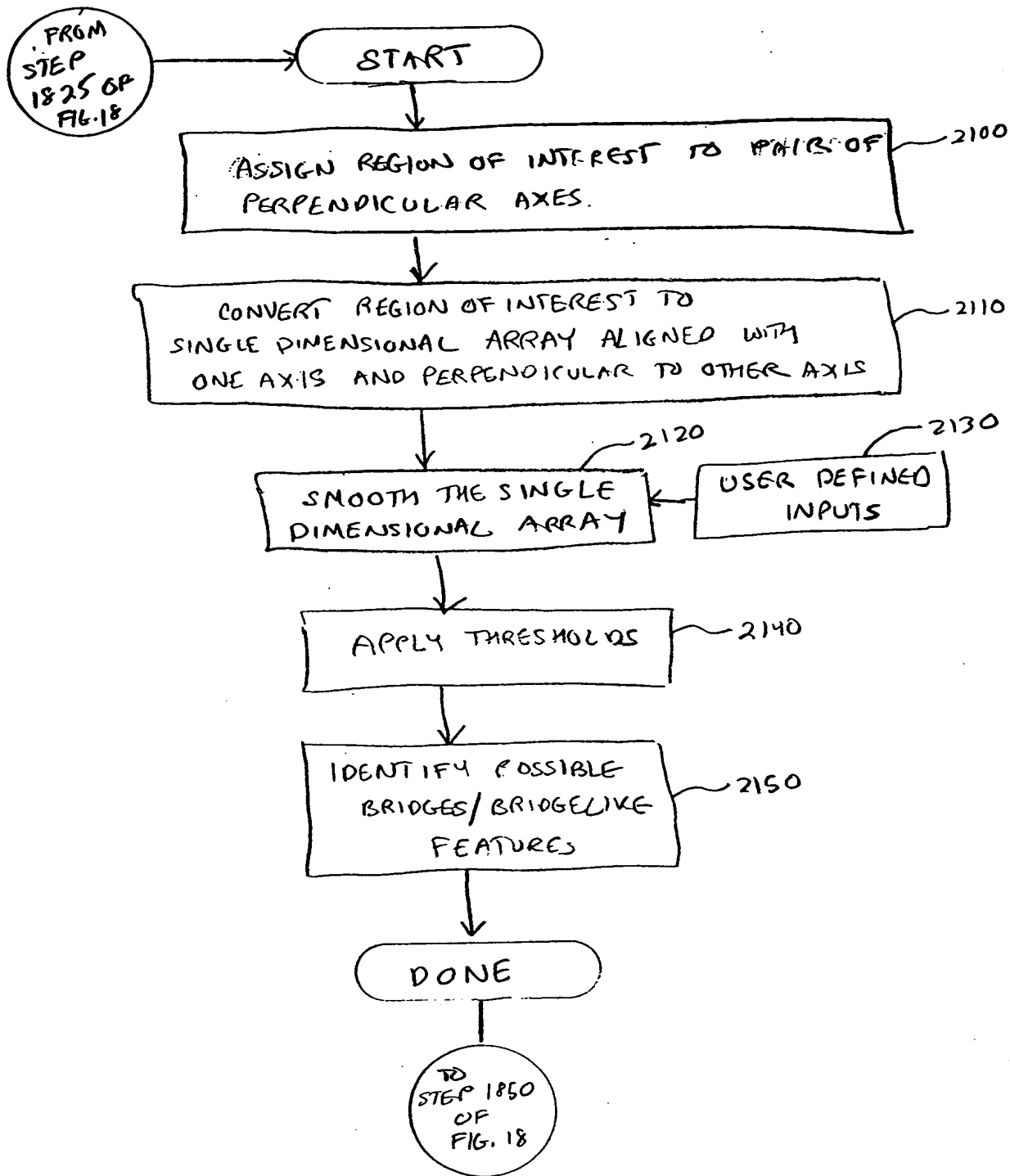


FIG. 21

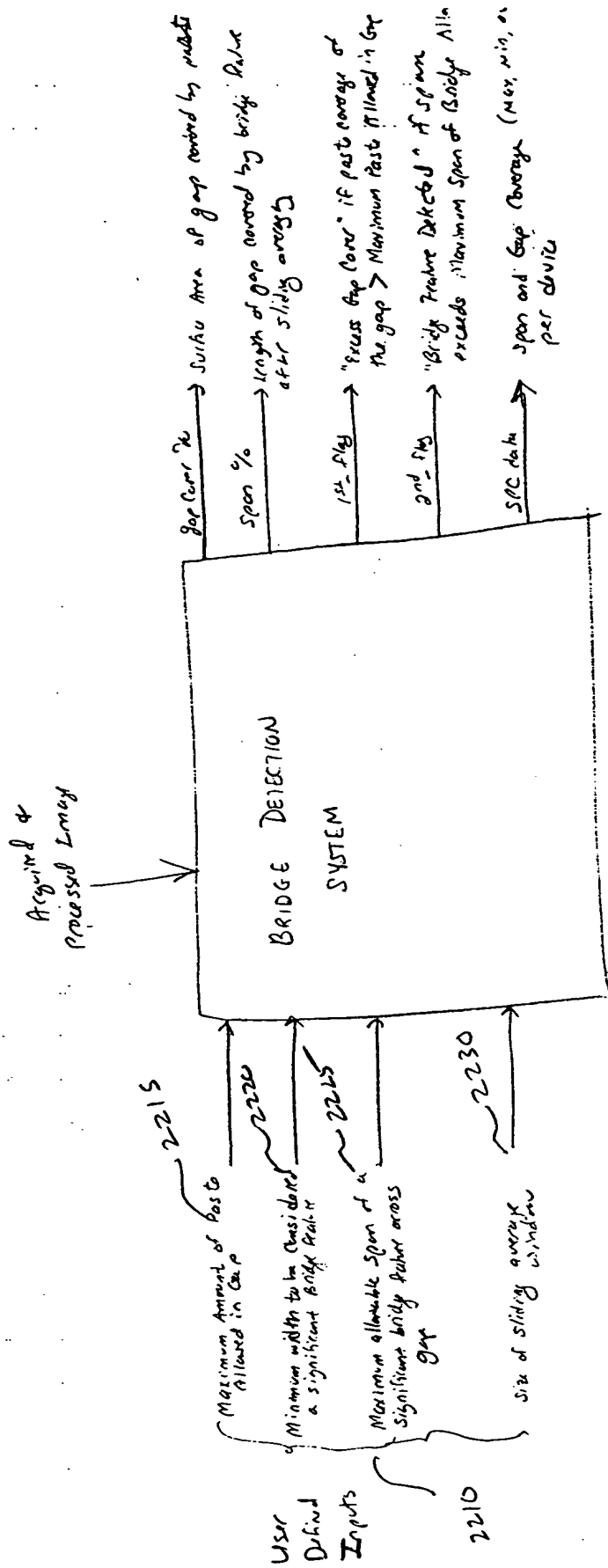
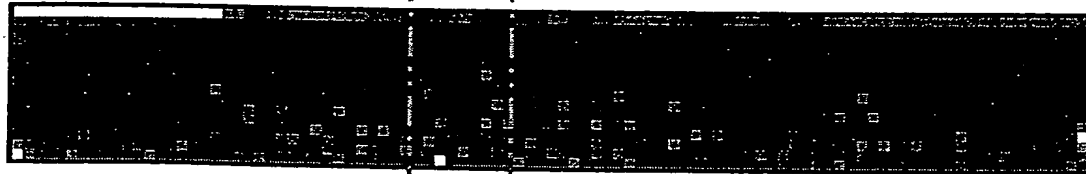


FIG. 22

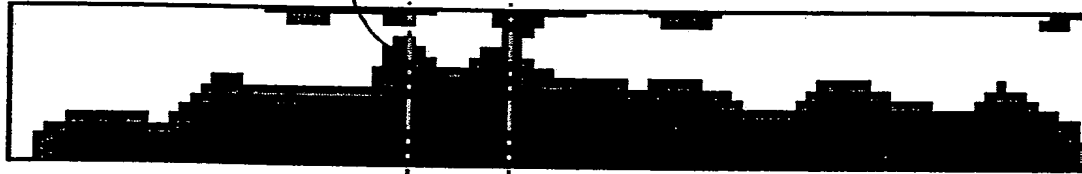
2200

Enhanced
Image of
Gap



(A)

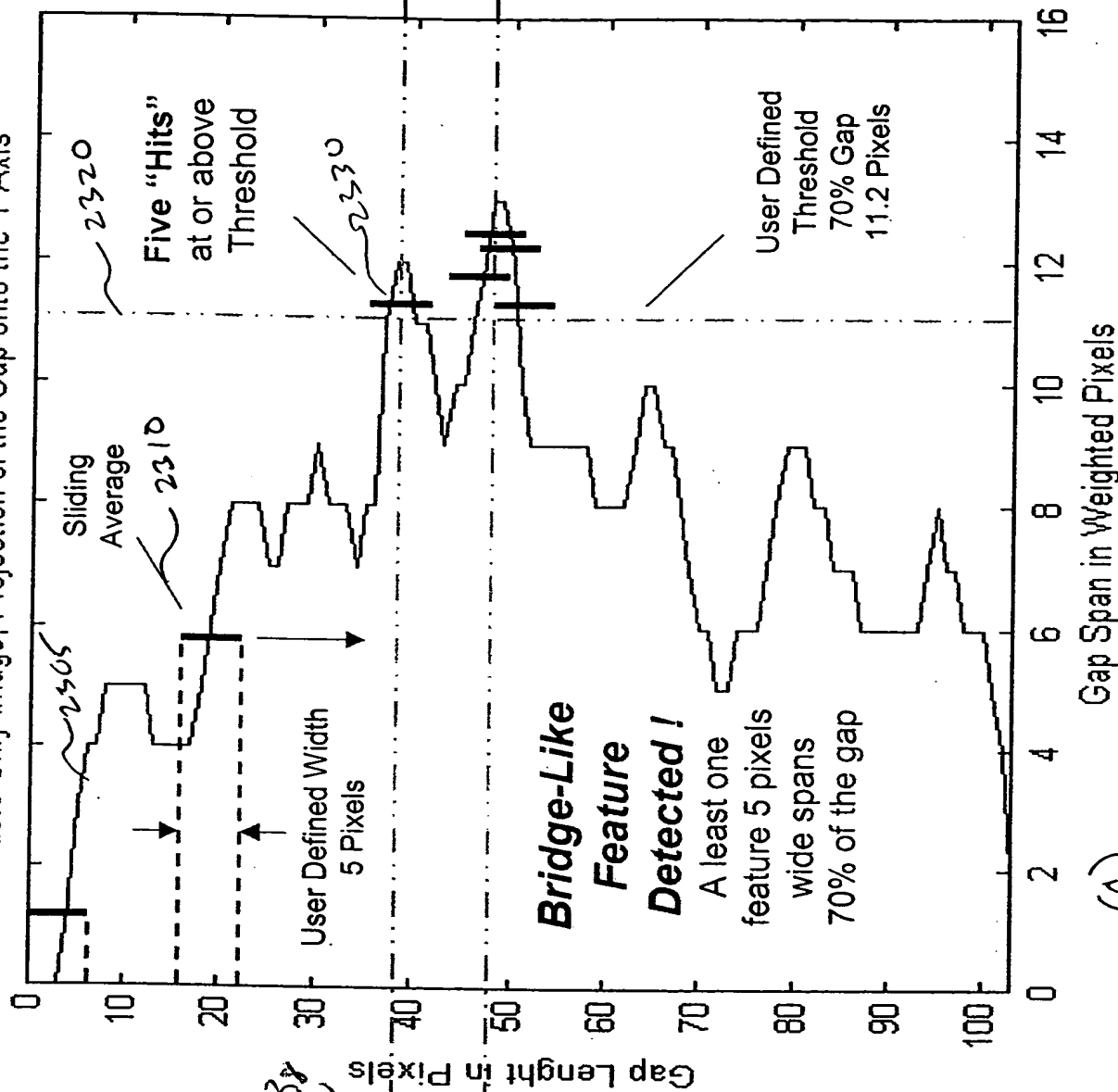
Paste-Only
Image of
Gap



(B)

45% Weighted
Paste Coverage
in Gap

Paste-Only Image, Projection of the Gap onto the Y Axis



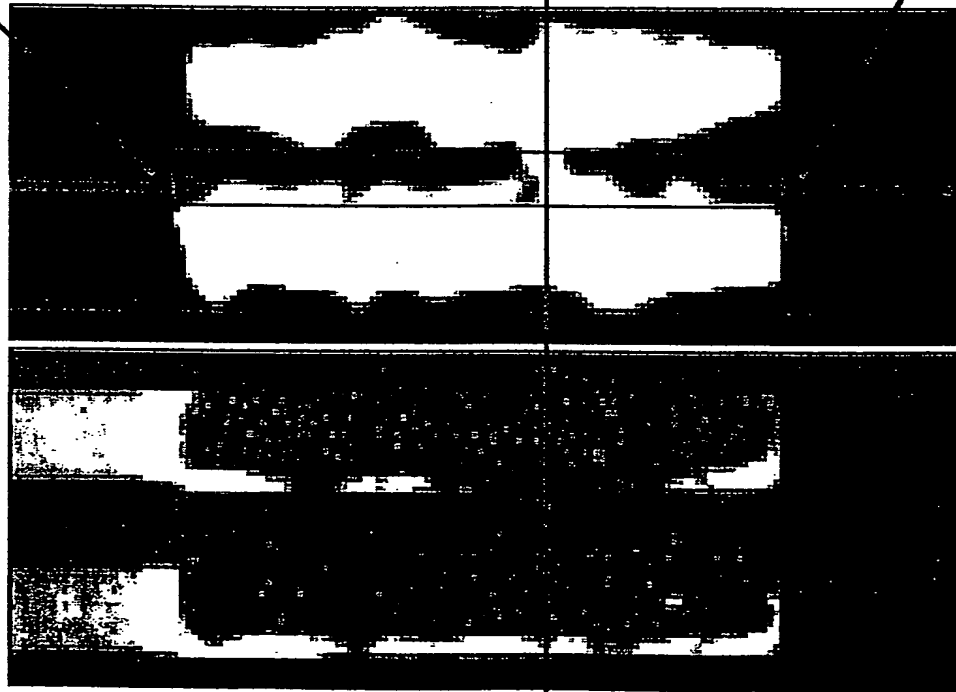
(C)

FIG. 23

Gap Projection and Sliding Average

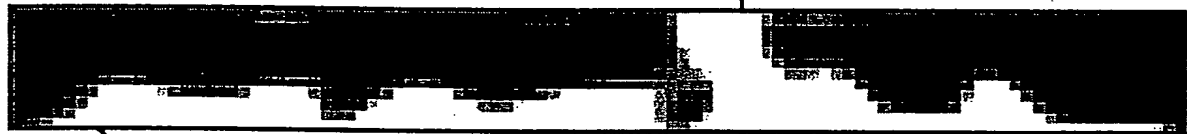
Run-Time Tile

Paste-Only Tile



(A)

(B)



Gap ROI

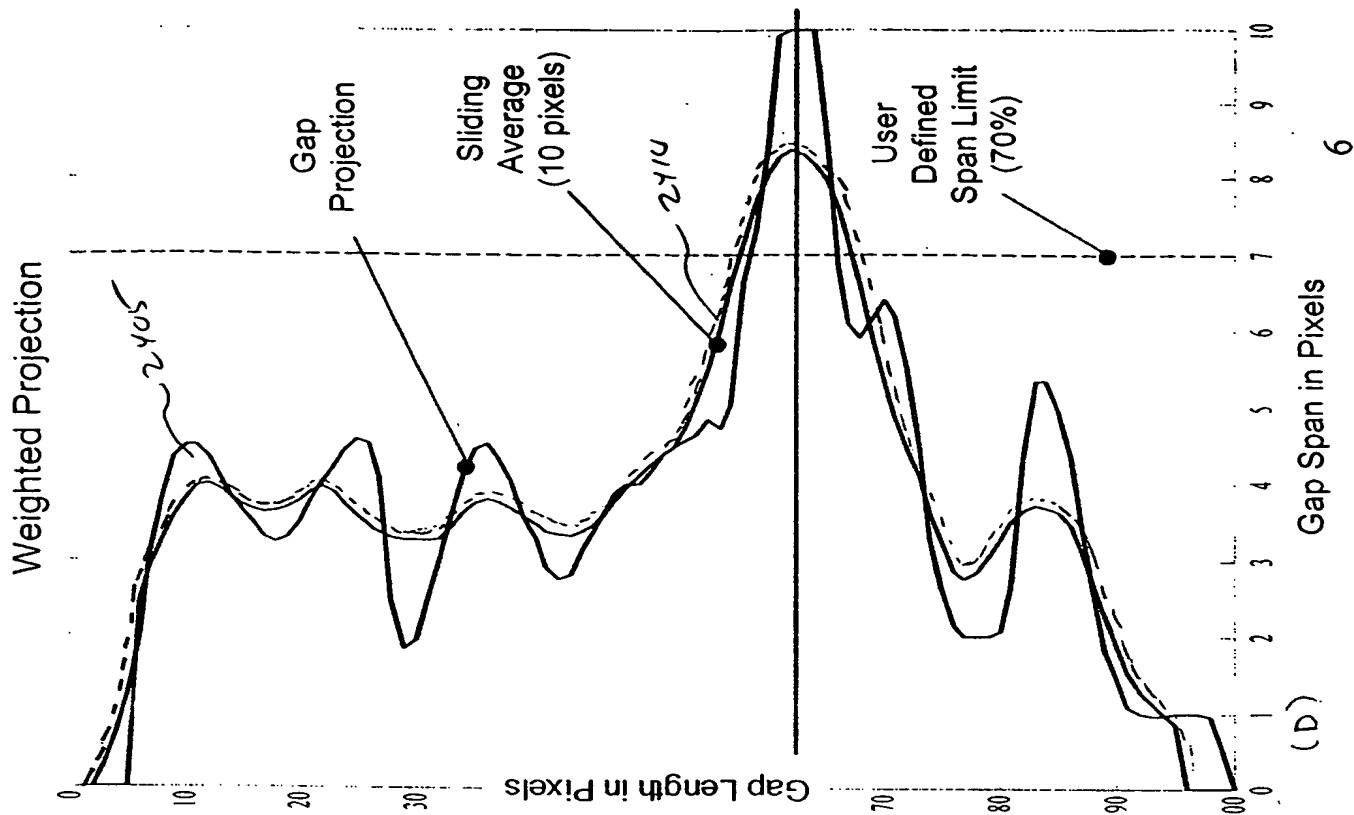


FIG. 24

Raw Image of Gap



(A)

Paste-Only Image of Gap



(B)

36% Weighted Paste Coverage in Gap

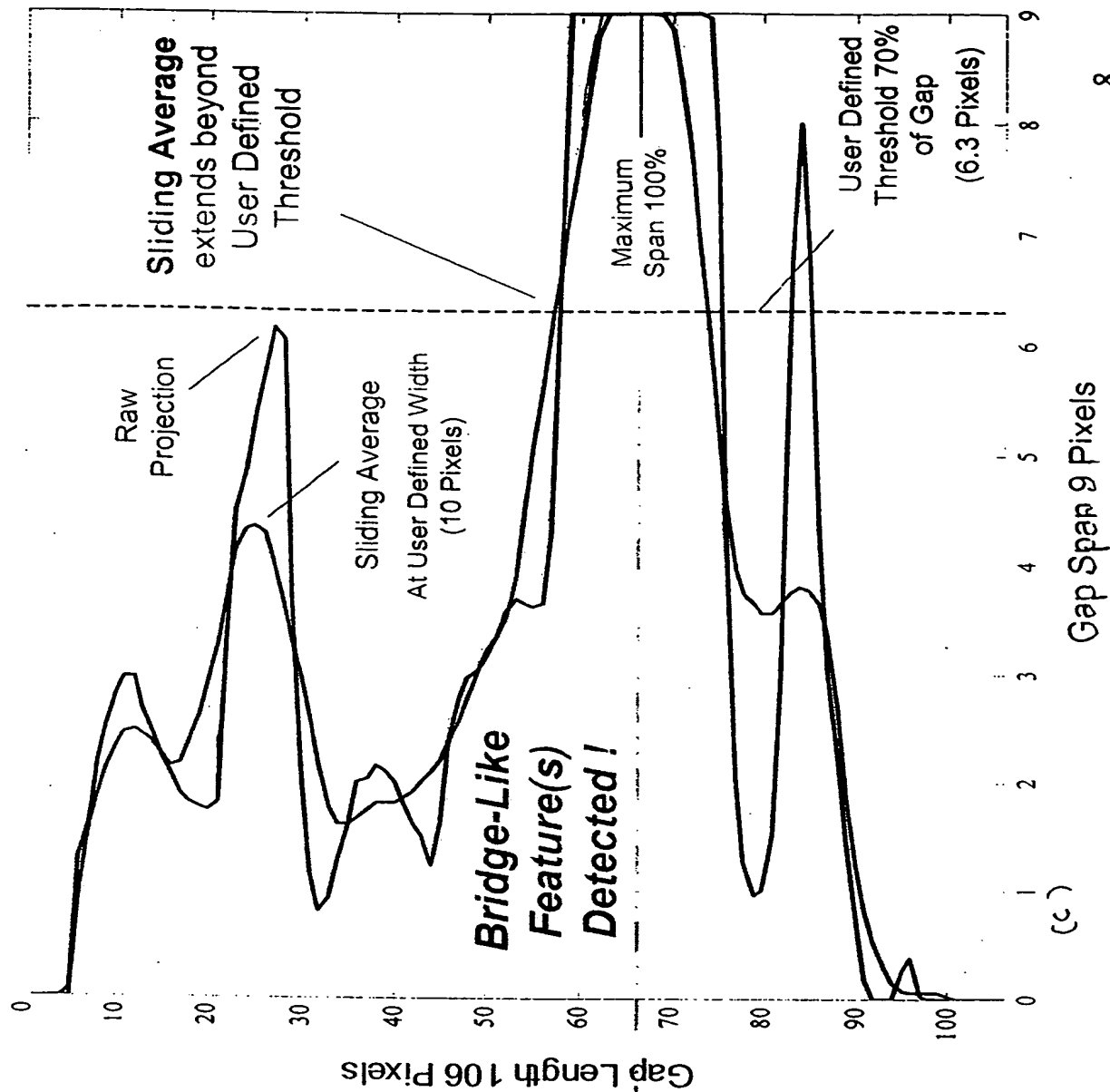


FIG. 25

Effect of Pad Size Variations

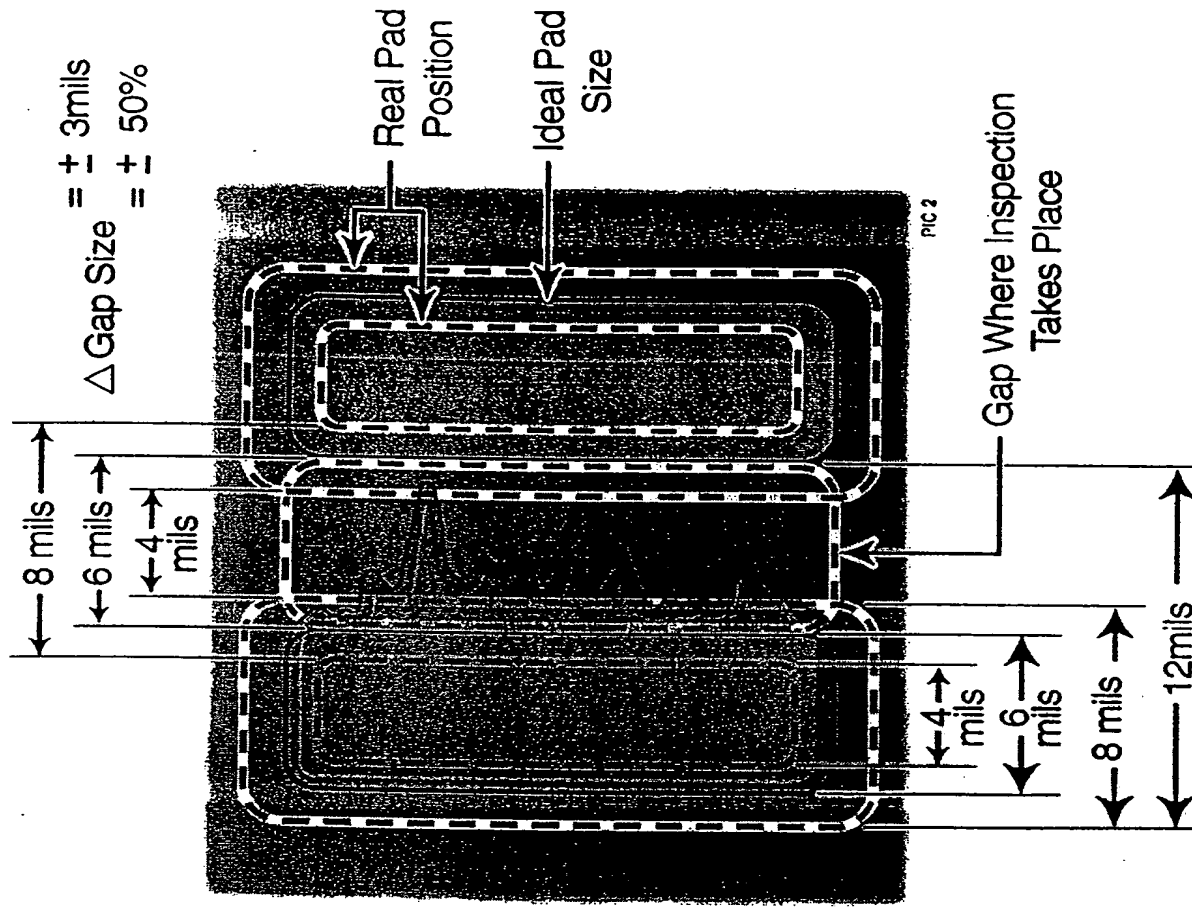
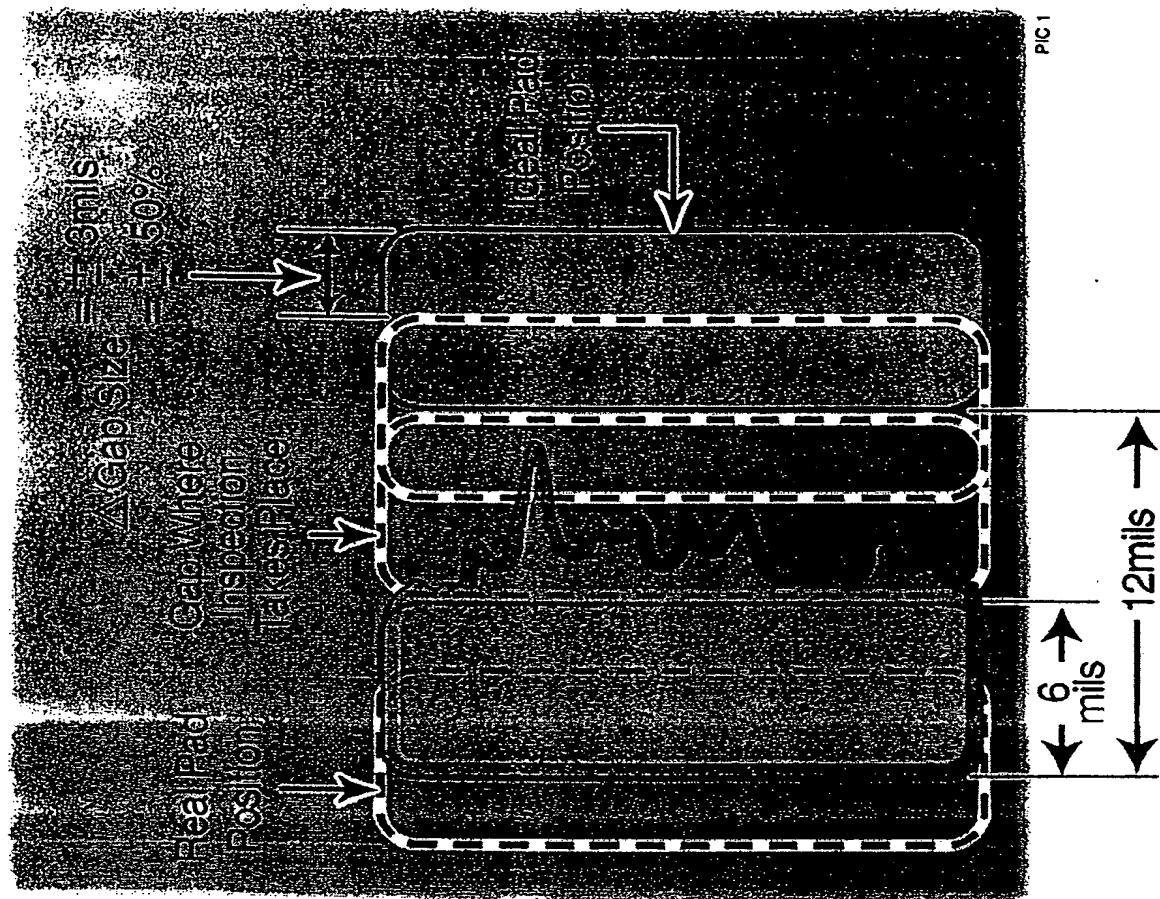


FIG. 26



PIC 1

FIG. 27

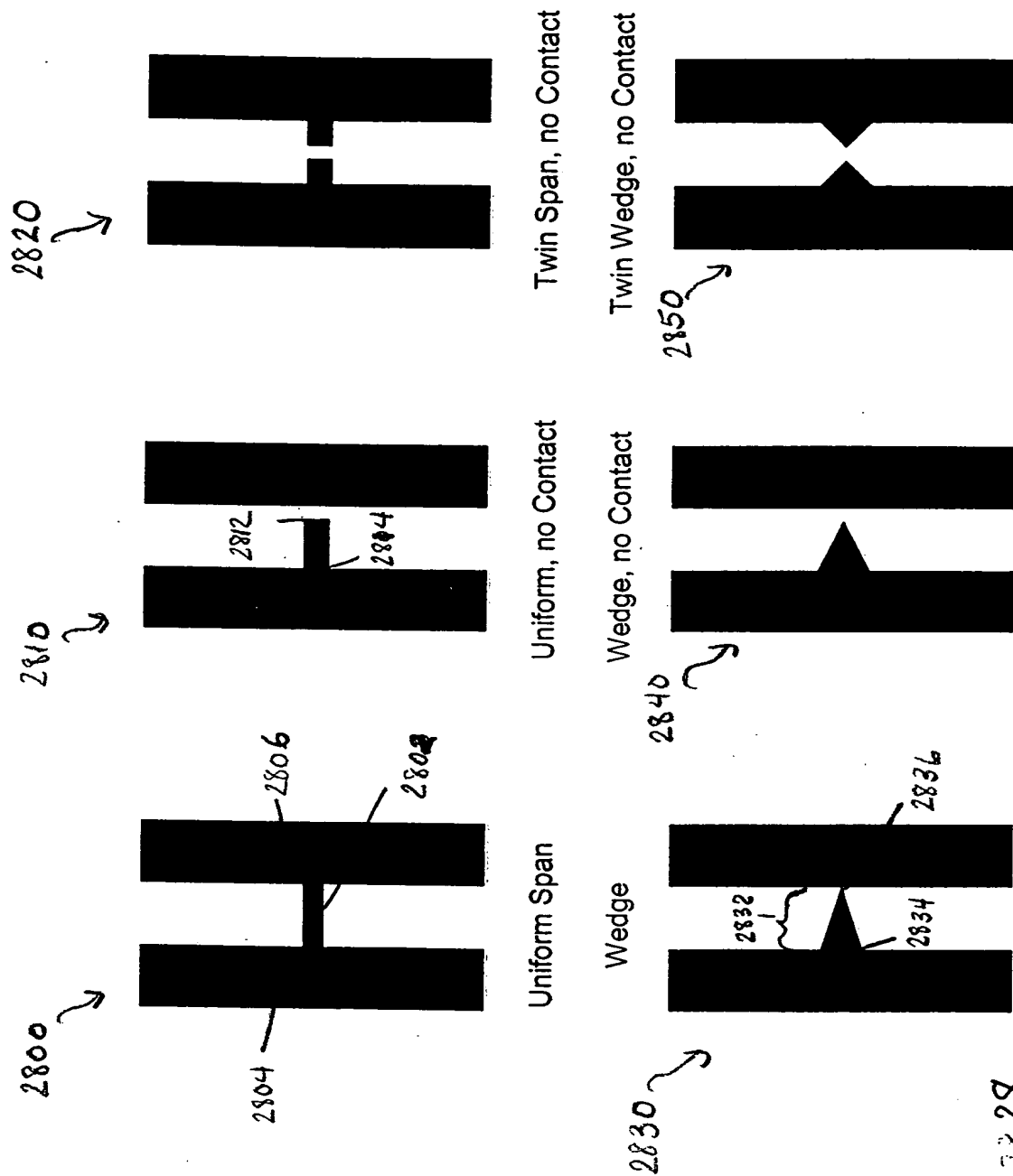


FIG. 28

All "Bridges" Shown are 6% of Gap

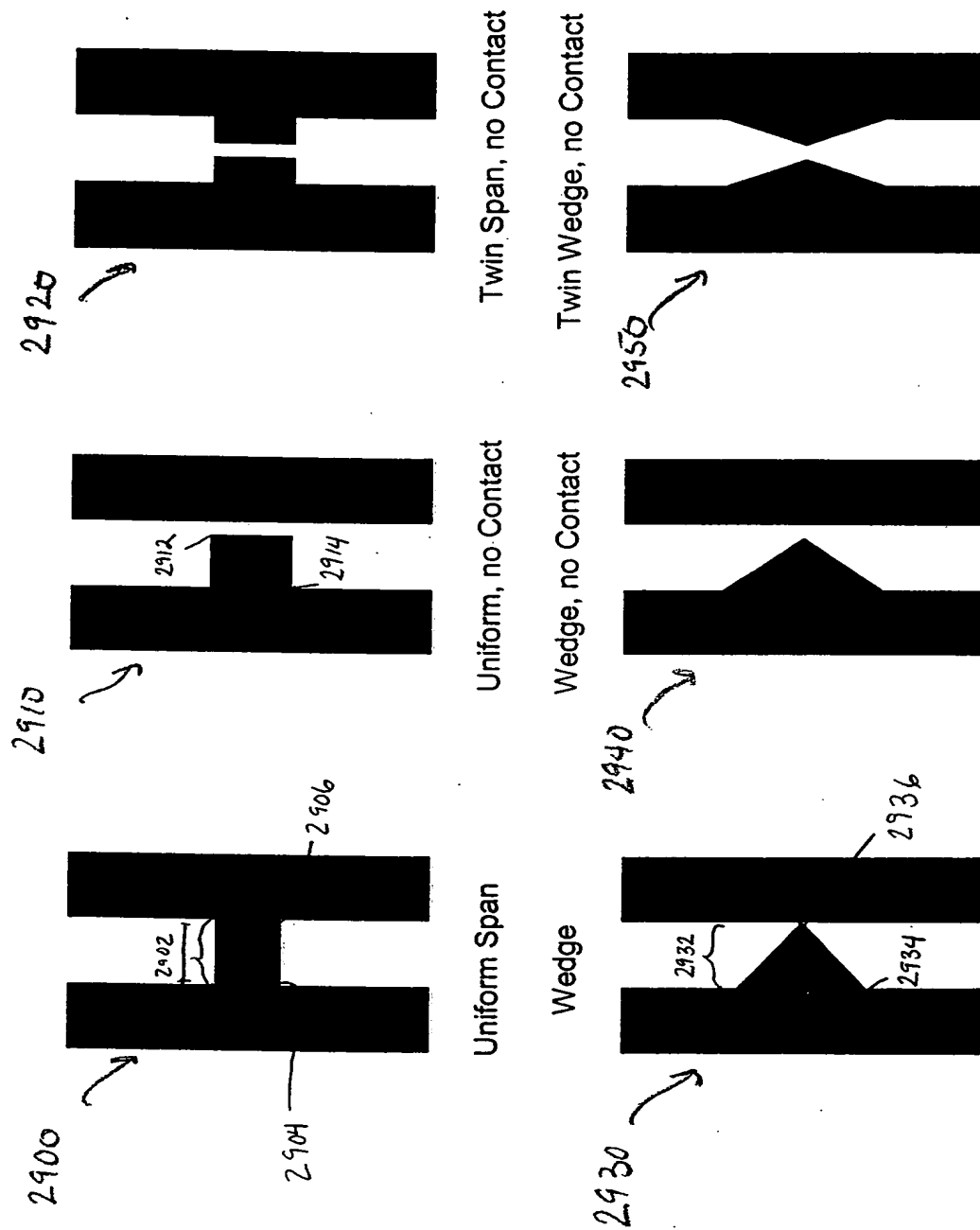
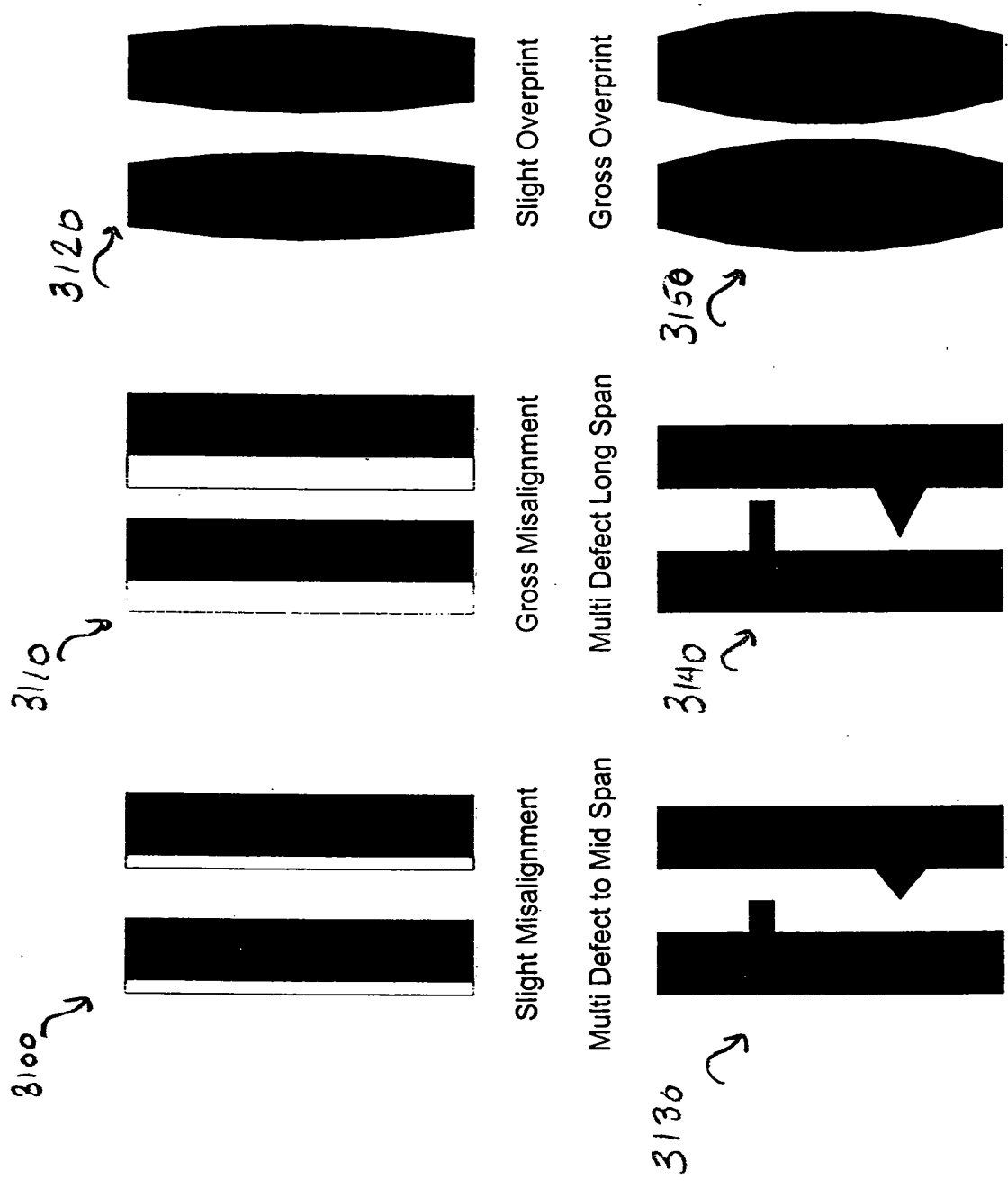


FIG. 29
"Bridges" are 18% of Gap



Other Gap Defects

FIG. 31